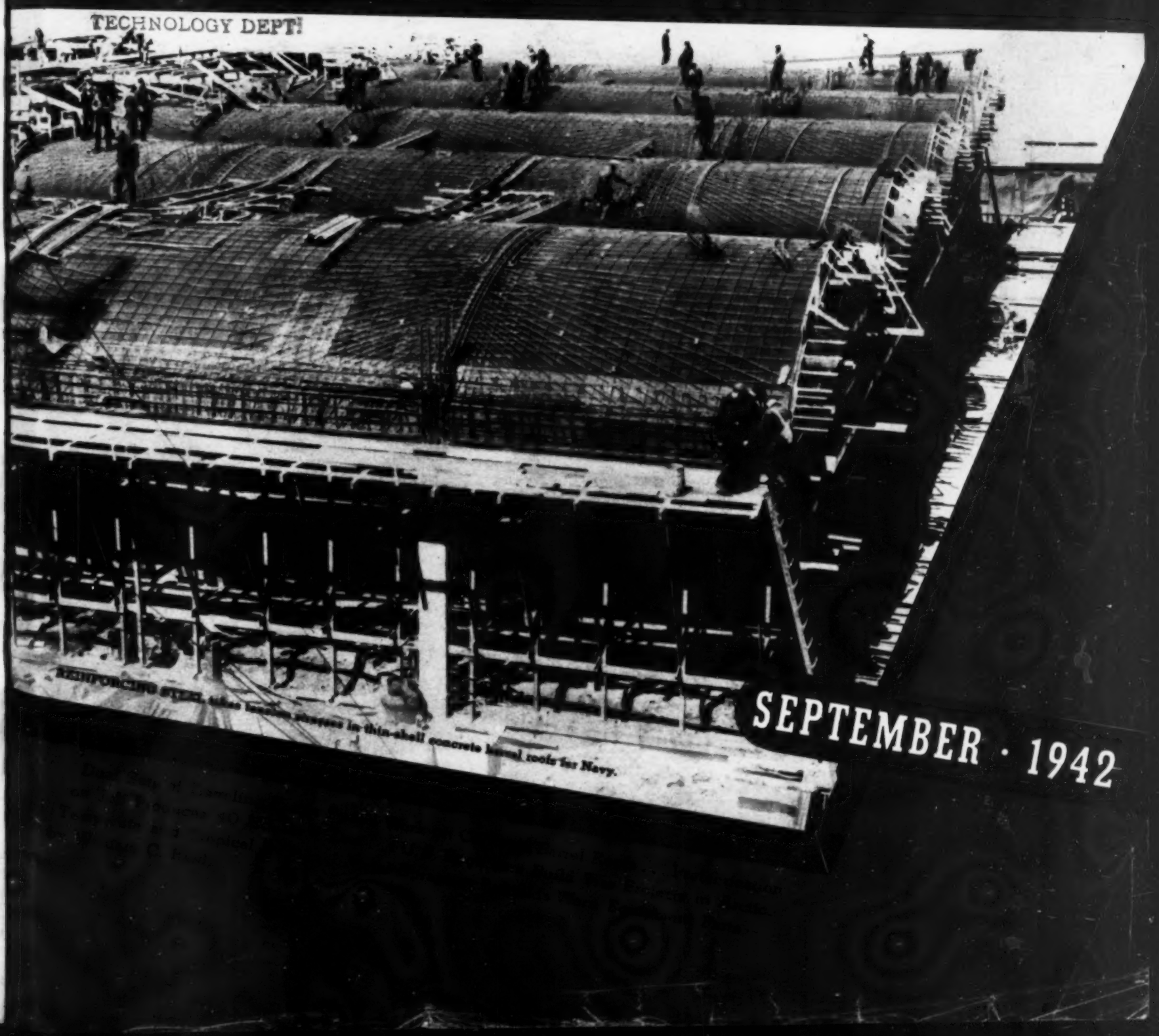
Construction Methods



REINFORCING STEEL, other familiar shapes in thin-shell concrete hangar roofs for Navy.

SEPTEMBER · 1942

CONSERVE STEEL
For Our Fighting Forces

Foresighted management now is doing everything possible to conserve the steel already in service, making it last so that all new steel can go into America's war effort.

Preventing corrosive destruction is one effective way to conserve steel and help fight the war on the home front. The initial step is to critically examine all buildings and equipment—bridges, columns, trusses, floors, stairs, roofing, siding, ventilators, ducts, piping, tanks, fences, cranes, machinery, etc.—everything made of steel that is subject to corrosion from dampness, the weather or process fumes.

Paint manufacturers can offer good advice on effective methods of cleaning, and on primer and finish coats that will protect and conserve steel in and about your plant. A program to preserve steel has a valuable secondary advantage, too. Many shades of paint reflect light, and better lighting cuts spoilage, speeds production and reduces the hazards of accidents to America's war workers.

A conservation program more than pays for itself in lower maintenance and replacement costs, but more important now, every pound of steel that is saved is a boost to the war effort.

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CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public — In Ohio a manufacturing plant will be erected by **A. M. Higley Co.**, of Cleveland, at an estimated cost of $20,000,000, to be financed by Defense Plant Corp. **George Buckler Co.**, of Portland, Ore., was awarded an $18,000,000 government housing contract in Oregon. An industrial plant is under way in North Carolina for National Carbon Co., Inc., to cost approximately $6,000,000; Defense Plant Corp. will finance. **Gillmore, Carmichael, Olsen Co.**, of Cleveland, Ohio, will do the constructing. Successful bidder for housing contract in Ohio was **Hunkin-Conkey Construction Co.**, of Cleveland, with bid of $6,800,000. Maryland and West Virginia housing contracts are under construction by **John A. Johnson & Sons, Inc.**, of Brooklyn, N. Y., for $6,010,000. In Arizona, frame storage buildings are being built by **Jerome A. Utley**, of Detroit, Mich., for approximately $5,000,000. Temporary frame buildings are under construction in Arkansas by **Foster & Creighton Co., Forcum-James Co.**, and **Oman Construction Co.**, of Dyersburg, Tenn., for an estimated cost of $5,000,000.

Contract for frame buildings in Arizona will be built by **J. S. Sundt & L. M. White**, of Tucson, estimated to cost between $1,000,000 and $5,000,000. **Lineburger-Senne Construction Co.**, of Little Rock, Ark., will construct frame buildings in Arkansas, for approximately $5,000,000. Temporary frame buildings are under way in Florida by **Williams Construction Co.**, of Columbus Ga., at an estimated cost of $5,000,000. **Woodcrest Construction Co.**, and **Rosoff Bros., Inc.**, of New York, are constructing temporary frame buildings in Iowa, for approximately $5,000,000. Frame buildings in Indiana, to cost between $1,000,000, and $5,000,000 are under construction by **O'Driscoll & Grove, Inc.** and **H. L. Fischer, Inc.** of New York. Utilities contract in Oklahoma went to **Hair, Christie & Mason**, of Wichita Falls, Tex., estimated to cost between $1,000,000 and $5,000,000. An industrial plant contract in Oklahoma was awarded by Navy Department to **Brown & Root** and **J. W. Bellows Construction Co.**, at an estimated total of $5,000,000. In Washington, contract for concrete, steel frame structures was awarded to **Sound Construction & Engineering Co.**, of Seattle, for approximately $5,000,000. **Ford J. Twaits Co.**, of Los Angeles, will build an industrial plant in California, at an estimated cost of $5,500,000, to be Federally financed. Another industrial plant contract in California went to **Stone & Webster Co.**, of Los Angeles, for $5,000,000; Defense Plant Corp. will finance.

HEAVY CONSTRUCTION

Successful bidders for Texas and Illinois pipeline contract were **Williams Bros. Corp.**, of Tulsa, Okla., **O. E. Dempsey Construction Co., Anderson Brothers** and **Sheehan Pipe Line Construction Co.**, also of Tulsa; **Oklahoma Contracting Co.** of Dallas, Tex., and **C. S. Foreman Co.**, of Kansas Mo., and **Ray E. Smith Construction Co.**, of Eldorado, Kan., with bid of approximately $35,000,000, to be financed by Defense Plant Corp. Runways are under construction in Wisconsin by **L. G. Arnold, Inc.**, of Eau Claire, **J. R. Griffith Co.**, of Racine, and **Thornton Construction Co.**, of Sparta, estimated to cost between $1,000,000 and $5,000,000. Contract to erect structural steel in Georgia went to **Bethlehem Steel Co.**, of Bethlehem, Pa., for approximately $5,000,000. Contract for runways, taxiways, roads and drainage in Kansas was let to **List and Clark Construction Co.** and **San Ore Construction Co.**, of McPherson, at approximate cost of $5,000,000.

HIGHWAYS

Among recent highway contract awards are the following: California: $327,827 to **John Carlin Construction Co.**, of Redding; $384,952 to **Griffith Co.**, of Los Angeles. Colorado: $1,000,000 to **Brown Construction Co.**, of Colorado Springs. Florida: $1,957,338 to **Belcher Oil Co.**, of Miami. Kansas: $500,000 to **Ottinger Bros.**, of Oklahoma City, Okla. Maryland: **$597,540 to F. Carozza & Son, Inc.**, of Baltimore; $375,856 to **J. H. Ensey**, of Baltimore; $235,668 to **M. J. Grove Lime Co.**, of Lime Kiln. New Jersey: $694,866 to **Union Building & Construction Co.**, of Passaic. Oklahoma: $500,000 to **Vilbig Construction Co.**, of Dallas, Tex. Ohio: $615,416 to **General Asphalt Paving Co.**, of Canton. Oregon: $229,154 to **E. C. Hall, J. C. Compton** and **McNutt Bros.**, of Eugene. Pennsylvania: $657,343 to **Harrison Construction Co.**, of Pittsburgh. South Carolina: $500,000 to **R. B. Tyler Co.**, of Louisville, Ky. South Dakota: $500,000 to **W. H. Noel Co.**, of Jamestown, N. D. Tennessee: $3,000,000 to **T. M. Striden & Co.**, of Nashville. Wisconsin: $278,548 to to **Streu Construction Co., of Two Rivers.**

SEPTEMBER, 1942

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **MULTIPLE-BARREL CONCRETE ROOFS** were constructed with dual sets of traveling forms. —p. 42

How **PRECAST SCREED BLOCKS** supported reinforcing steel and runway trestles. —p. 44

How **CONCRETE-BLOCK WALLS** provided permanent protection against sabotage and bomb splinters. —p. 46

How **RUBBER BAG,** inserted in pipe and inflated, stopped gas flow in bombed main. —p. 46

How **OVERHEAD GRAVITY ROLLER CONVEYOR** delivered materials to fabricating mill on housing job. —p. 49

How **STAPLING HAMMERS** fastened rock-wool batts in ceiling panels. —p. 50

How **GLUE GUN** applied adhesive to frame lumber before plywood sheathing was attached. —p. 50

How **POWER AUGER** dug 425 holes in 16 hr. for concrete foundation piers. —p. 51

How **CONCRETE BATHTUBS,** lined with tile, were cast upside down. —p. 51

How **METAL SPRAYING** has been used to rebuild worn equipment parts. —p. 52

How **LIGHT-WEIGHT SPRAY GUN** applied metal to build up worn machine parts. —p. 53

How **ELECTRIC HEATER** simplified tightening of big bolts to avoid undesirable stresses. —p. 55

How **CLIMATIC CONDITIONS** governed design and construction of U.S. Engineer projects. —p. 56

How **INCLINED CABLEWAY** delivered pipe from beach to top of slope. —p. 56

How **LONG-BOOM CRAWLER CRANES** erected steel frame of aircraft plant. p. 58

How **DEMOUNTABLE BARRACKS** were constructed of prefabricated sections unloaded at off-shore base. —p. 60

How **BURIED STEEL TANKS** were installed for gasoline storage —p. 61

How **LUBRICATION TRUCK** serviced equipment on highway job. —p. 62

How **METAL STOVEPIPES** served as pier forms. —p. 63

How **SKILLFUL BATCHING LAYOUT** for truck mixers got large production out of small area. —p. 66

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The Aviation Industry is doing its job . . .

A Year's Production A Week – Every Week

A MERE hundred planes a month in 1938; 200 in 1939; 450 in 1940; 1,600 in 1941, and today, as this is written, plane production goes on at a rate of 5,000 a month. A previous year's production now in one single week – every week.

So begins the story of the greatest industrial expansion in history; an industrial miracle that far surpasses anything our enemies ever have done or can do. Not only did we out-produce the Axis but the acceleration in our production during the past 12 months exceeded the greatest increase in German output during their forced-draft war preparation of 1939, when their production rose from 1,100 to 1,600 planes per month.

The toughest part of our job was accomplished in 20 months. We boosted deliveries from 100 or so to 1,000 planes a week, passing the combined Axis powers. Today, Germany's curve is flattening; ours is climbing steeply. Lt. Gen. Henry H. Arnold, Chief of the Army Air Forces, assures us that Army contractors will produce not less than 148,000 planes in the remainder of 1942 and in 1943. During that same period Navy contractors will turn out at least 37,000 additional planes.

Manpower in the airframe, engine and propeller industries was increased from 125,000 to 450,000 workers during the past 20 months, with the prospect that the industry will be employing more than 1,000,000 men and women in 1943. Many manufacturers are solving their personnel problems by recruiting women workers. More than 40,000 of them – teachers, stenographers, waitresses, housewives and school girls – today are welders, assemblers, machine operators and inspectors on aircraft production lines. Productive floor space in the airframe, engine and propeller industries expanded from 18,000,000 sq. ft. to nearly 55,000,000 sq. ft. during the last 20 months. Further expansion to more than 60,000,000 sq. ft. may be expected this year and an ultimate figure of more than 100,000,000 is a distinct possibility.

To grasp the full magnitude of this task we must remember that a single medium bomber has 30,000 parts, which are built into 650 minor sub-assemblies to make 32 major sub-assemblies. The entire process involves 30,000 man hours of labor. Each of the two engines in this plane requires 50,000 specialized inspections. Every one of the 50 instruments entails many hours of precision workmanship. Yet today there is one factory turning out 4 bombers every day. Another produces fighters at the rate of nearly 20 a day.

To the amazement of the entire world these manufacturing miracles were accomplished without sacrificing the high standard of American aeronautical equipment. There has been some loose talk about the quality of our combat airplanes as compared with those of our allies and our enemies. Indisputable evidence of the superior stamina of our aircraft under fire is written between the lines of almost every war communique. Every battle record tells a story of heavy losses inflicted at small cost upon numerically superior enemy forces. The consistency of this performance on all the far-flung battlefronts constitutes the most eloquent testimony of the high calibre of our designs, our manufacturing methods and the skill and daring of our pilots.

And let us remember that our decisive victory in the battle of production was not won without headaches and heartaches on the part of management, labor and government.

When the President sounded the call for 50,000 planes in the spring of 1940, the program called for only 5,500 military aircraft. Government and industry reeled from the shock – both determined, however, that it ***could and would be done.***

The Army, the Navy and the old Defense Advisory Commission set to work to draft a program. This has been revised many times – upward! Congress then proceeded, more slowly, to modify the laws that would have obstructed the realization of the objective. Then the aviation industry, without contracts, in the face of discriminatory profit-limitative legislation, and with nothing but oral assurances of governmental intentions, went ahead with its Herculean expansion plans. New factories were completed long before facilities-contracts and their funds were forthcoming.

The rugged individualists who had founded and built the aviation industry cast aside their rivalries and embarked upon a period of unselfish cooperation. Priceless engineering experience was exchanged. Material was relinquished for transfer to plants where it was needed more urgently. Successful personnel training methods and experience in the use of women workers were pooled for the benefit of all concerned. During one recent month, the cooperation among eight southern California plants averted more than 1,860 potential bottlenecks in production.

As the lessons of the war dictated the need for greater numbers of particular airplane types, many manufacturers accepted orders for planes designed and developed at rival factories. Striking examples are the long range bombers being turned out by plants where only trainers, fighters or dive bombers formerly were made.

Mindful of the risk involved in educating rivals, thereby creating future potential competition, subcontractors nevertheless were sought and trained by pioneer manufacturers. Makers of toys and wheelbarrows, automatic stokers and linoleum were among those who rallied to the call. Within a year subcontracting rose from 13 to 36 per cent of the total program. It still is rising.

When the automotive industry came into the picture, aviation manufacturers gave generously of their time and knowledge to start the newcomers. Liberal licensing arrangements enabled them to reap the full benefits of technical developments. Automotive engineers swarmed through the aviation plants in search of the exacting "know-how" of the aeronautical industry.

Each type of aircraft that reaches the production stage is the result of long periods of research, design and development. The unseen workers toiling in the wind tunnels and the laboratories of government and industry are the unsung heroes who tirelessly are striving to surpass all previous efforts. Their brilliant accomplishments are eloquent testimony of the superiority of men and women who are blessed with freedom of action and thought. Today more than 20 experimental combat airplanes are under development and will replace older types as soon as they fulfill the exacting requirements of our armed forces. Among these are aircraft that promise to outfight and to out-perform any and all of the much vaunted warplanes of the Axis military machine. And this without loss of production.

Every man, woman and child of all the United Nations may fervently be thankful that those who chart our course in aircraft production have not frozen design to such a degree as to make impossible the immediate adoption of improvements as they come out of these laboratories.

What does this brilliant record mean in terms of final victory?

Every newspaper reader has learned this basic war lesson . . . air supremacy is the essential ingredient of military success. As the balance of air power shifts, so do the fortunes of war.

In those dark days when our output was 500 planes a month, Germany's was 2,000 and the German air force was twice that of our Allies. When we reached 2,000 a month last fall, Germany had advanced to a monthly rate of 2,500. Today, as this is written, we have caught up with the enemy's backlog. The air forces of both sides are about equal numerically and United Nations' production exceeds that of the Axis by 27 per cent. Next summer (1943) both the air force and the output of the United Nations will be double those of all the Axis powers.

That is the pattern of ultimate victory!

The pattern of the peace to follow also is gaining in definition. The airplane has shriveled the world to one-fifth its former size. Its use as an instrument of destruction is but a momentary distortion of the pattern of human progress. Its potential power, as a stern preserver of peace, is beyond imagination. Today's air routes of our Army Air Force Ferrying Command are the international trade routes of tomorrow. Giant airliners, by reducing time and space, will speed fraternity among the nations and disunity will give way to better understanding and goodwill.

Flying freight trains, with aerial locomotives towing glider boxcars, will serve large cities, decentralizing population and giving to inland cities many of the commercial advantages of seaports. Air mail and passenger pick-up lines will fill the gaps between these transcontinental trunk lines and tie in the smallest hamlets. Universal fly-it-yourself services will provide airplane facilities for those who do not own low cost private aircraft. Roadable rotary wing aircraft and family planes of the fixed wing type may even run household errands.

The coming generation of business men who today is piloting our war planes will find aircraft as essential to business as it now finds them essential to victory.

Commenting on our war production record, Donald Nelson has said, "We are today in the position of men who realize that they are actually doing the impossible".

The mass production miracle that the aviation industry – management and workers alike – has performed through the all-out effort of free enterprise can and will serve civilization in peace as it has in war.

With this boundless new medium of transportation and its concurrent technological developments we shall rebuild our way of life to a rich, new fullness upon the ruins of a war-torn world.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the third of a series of editorials appearing monthly in all McGraw-Hill publications reaching more than one and one-half million readers.

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In addition to the safety factor, Atlas Manasite Detonators offer full dependability. The proof is in the figures: millions of Atlas Manasite Detonators have already been used. Furthermore, Atlas Manasite Detonators require no special methods of application—no special equipment. Nor do they cost any more.

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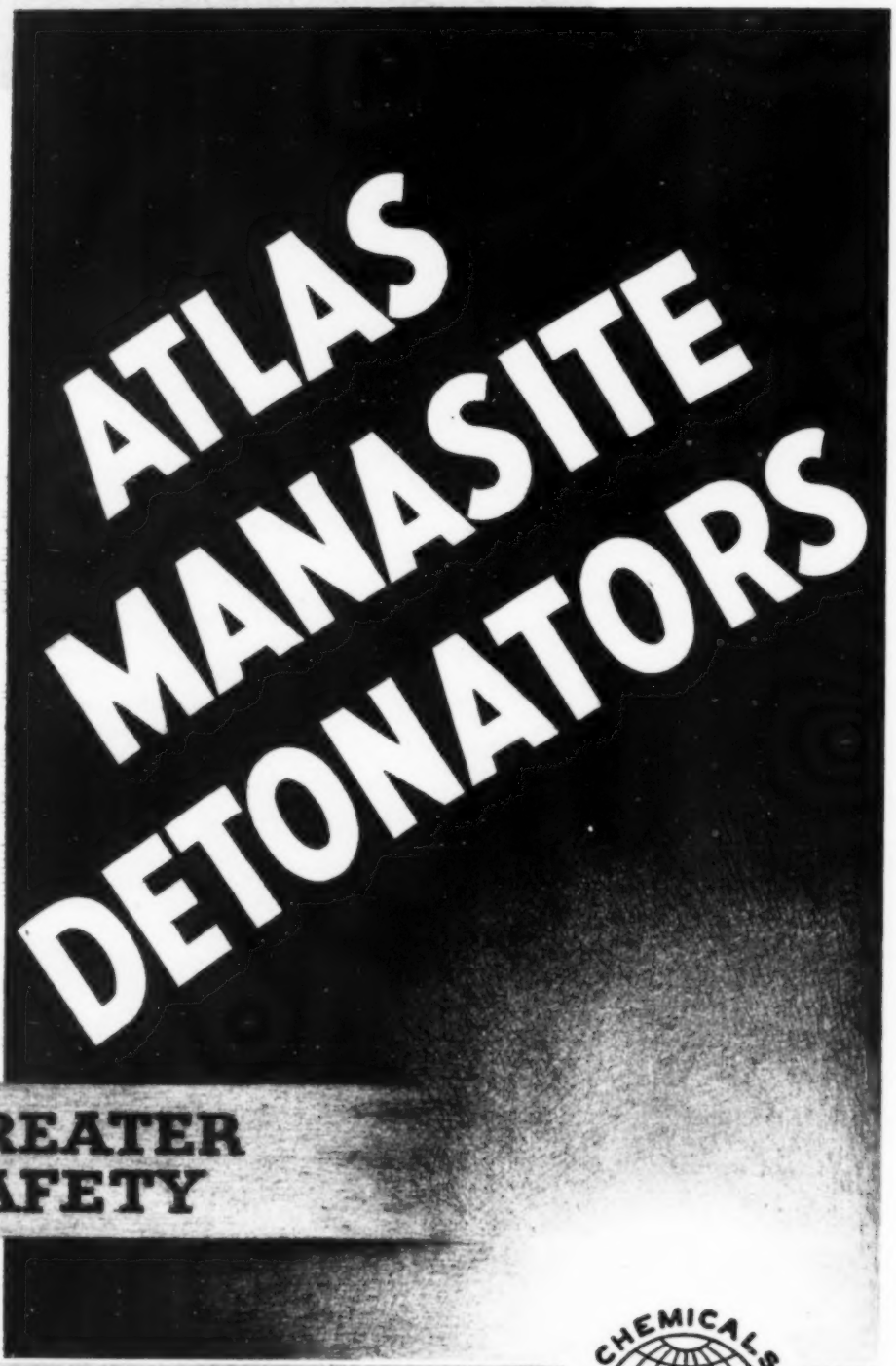

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● Every tire on your Bottom-Dump or Rear-Dump EUCLIDS, and other equipment you own or operate, is virtually an "Achilles Heel" — a vital point that must be given every possible protection. Here are four suggestions that will help you get the maximum service from your tires and thus keep your equipment in production longer:

Load Down Grade

Starting up steep grades from the loading area increases wear on drive wheel tires due to the tendency of the wheels to spin or slide on loose stone.

Keep Loading Area Clean

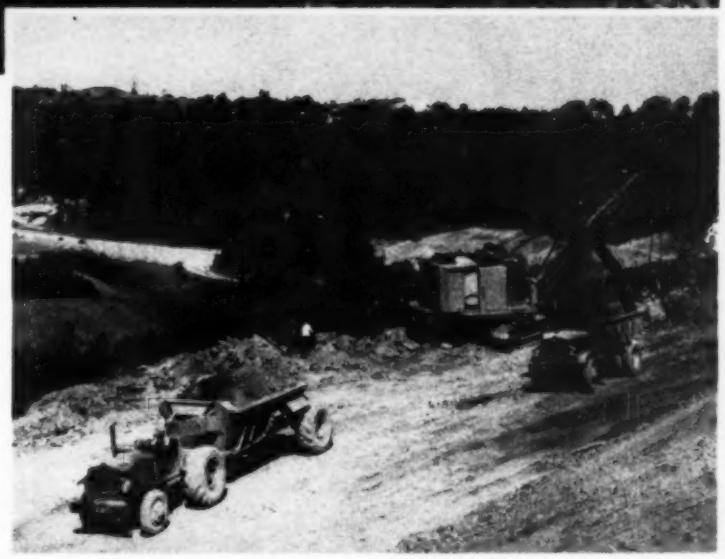
Loading, starting and stopping on loose rock or sharp stone causes unnecessary cuts and bruises — decreases the serviceable life of tires.

Fill Holes Promptly

Holes in the haul road or loading area are especially hard on dual tires because the load is supported by only one tire when the other passes over a hole.

Remove Loose Stone From Haul Road

On a hard surfaced haul road, stones press into tires instead of being compacted into the road — cuts, breaks in casings, and scuffing of traction surface result.



By giving your equipment tires more consideration and protecting them from unnecessary wear, you'll be getting the most out of an investment that may be mighty hard to replace. And even more important you'll be keeping your equipment in production for jobs that can't wait.

★ ★ ★

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HAULING EQUIPMENT
For EARTH . . ROCK . . COAL . . ORE
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Wanted urgently:

STEEL SCRAP

Shortage of steel scrap is threatening the war-production program.

If ships, planes, tanks and guns are to be produced in the volume needed to win the war, the country's steel-making facilities must operate at full capacity. But the plain truth is that the steel scrap to support continued capacity operations is not available, and not in sight.

United Effort Will Do the Job

Thanks to the construction of new blast furnaces, the deficiency is being partly made up by using more pig iron in steel-making. But tremendous quantities of additional scrap must be found within the crucial next few months.

Actually, many thousands of tons of steel scrap are potentially available *if only they can be gathered in*. This scrap, needed so urgently in the war effort, is scattered through the industrial plants, mines and railways, the farms and the homes of the nation. The problem is to collect it and get it moving to the steel mills. Everyone must help. If everyone will, there will be scrap to meet the needs of the war-production program.

Make a checkup in your plant or warehouse, or any other property you own or manage, and in your home.

Have any odds and ends of steel or iron that may be lying around collected. If you have any obsolete or idle equipment, machinery, or parts—anything that's made of iron or steel and isn't really needed—junk it, and get the scrap moving toward the steel mills.

How to Put Your Scrap to Work

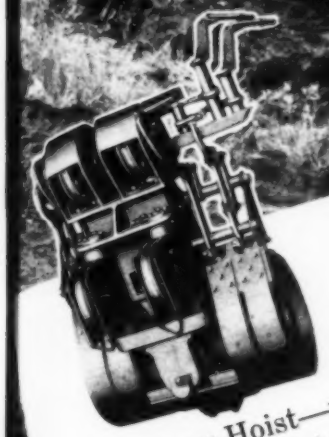
Some iron or steel now lying rusting and forgotten around your property may help to save the lives of Americans in the battle areas. Gather up every possible bit of iron and steel scrap. Sell it to a local junk dealer, or get in touch with your local scrap salvage committee. Put your scrap to work for your country. It's needed, now!

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Not a BALK in a BOWLFUL

with a Buckeye Hoist



NO SIR, you don't have any trouble pulling the loaded scraper bowl up out of the cut when you're using a Buckeye Hoist—no stalled engine—no need to kick out the master clutch. The line goes into action with a smooth, powerful pull at just the right speed to turn the trick, and the tractor keeps right on rolling. Talk about ease of operation! The power just flows through a Buckeye. It's because of the planetary design and the brake and clutch action—no jerks, no slipping. The power is applied properly and its under split-second, fraction-of-an-inch control right at the operator's fingertips.

Built in medium heavy duty and heavy duty models for all tractors. Write for full details and check Buckeye Unitilt Dozers, too.

BUCKEYE TRACTION DITCHER CO.
FINDLAY • OHIO

CHECK THESE BUCKEYE HOIST FEATURES:

- Planetary Design – superior for this type of service – longer-lived, easier to maintain.
- Large Drum Diameter – for longer cable life.
- Large Cable Capacity – spools enough to handle any tractor equipment.
- Large Braking Area – Buckeye brakes and clutches take hold smoothly and hang on.
- Cool Running – heat is rapidly dissipated – brake and clutch bands are in the open – long life is assured.
- High Leverage – permits easy control on the heaviest pulls with no slippage.
- Proper Sheave Design – keeps cables running smoother, longer.
- No Pull on Main Shaft – all transverse loads taken on bearings and housings.
- And many others.

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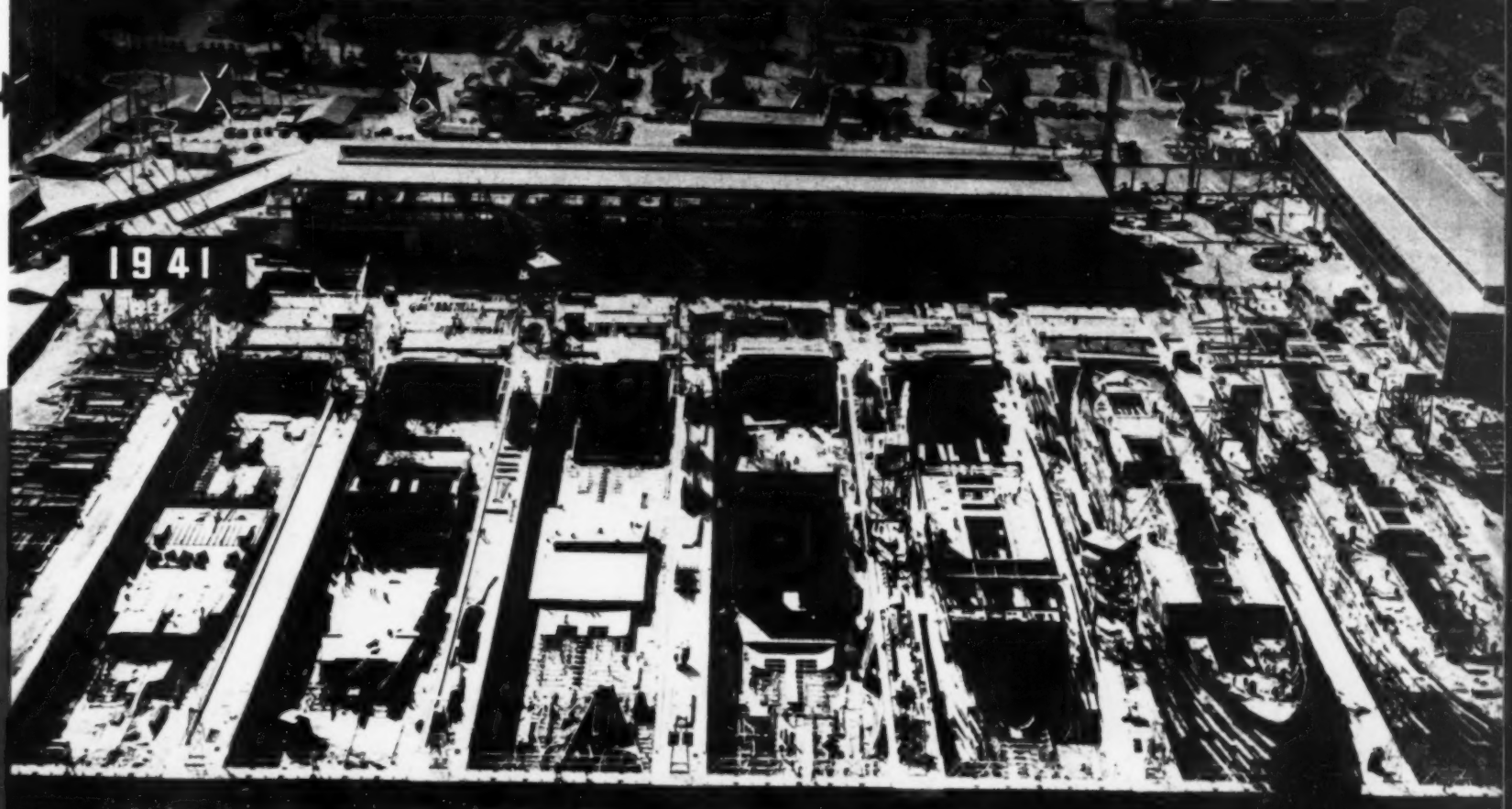
POZZOLITH CONCRETE
in Excellent Condition



Pozzolith used throughout this modern concrete shipbuilding basin, located on the Atlantic Coast.

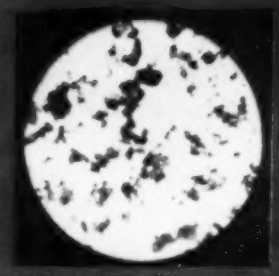
RESULTED IN ITS USE ON PROJECTS LIKE THIS...

YEARS of satisfactory performance in piers, dams and reservoirs gave the builders of this concrete ship-basin confidence that Pozzolith would produce the necessary high durability and watertightness.

Accomplishing results in many projects way beyond the expectations of the builders, Pozzolith is being used to insure, in addition to durability and watertightness, greater strength, workability, placeability and lower costs.

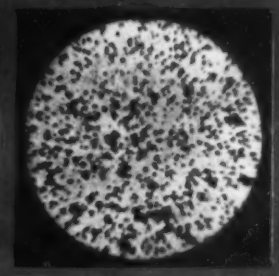
Whatever your requirements, you will find that Pozzolith offers definite and important advantages.

HOW CEMENT DISPERSION WORKS



Cement suspended in water
UNDISPERSED
WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See Photomicrograph above.)



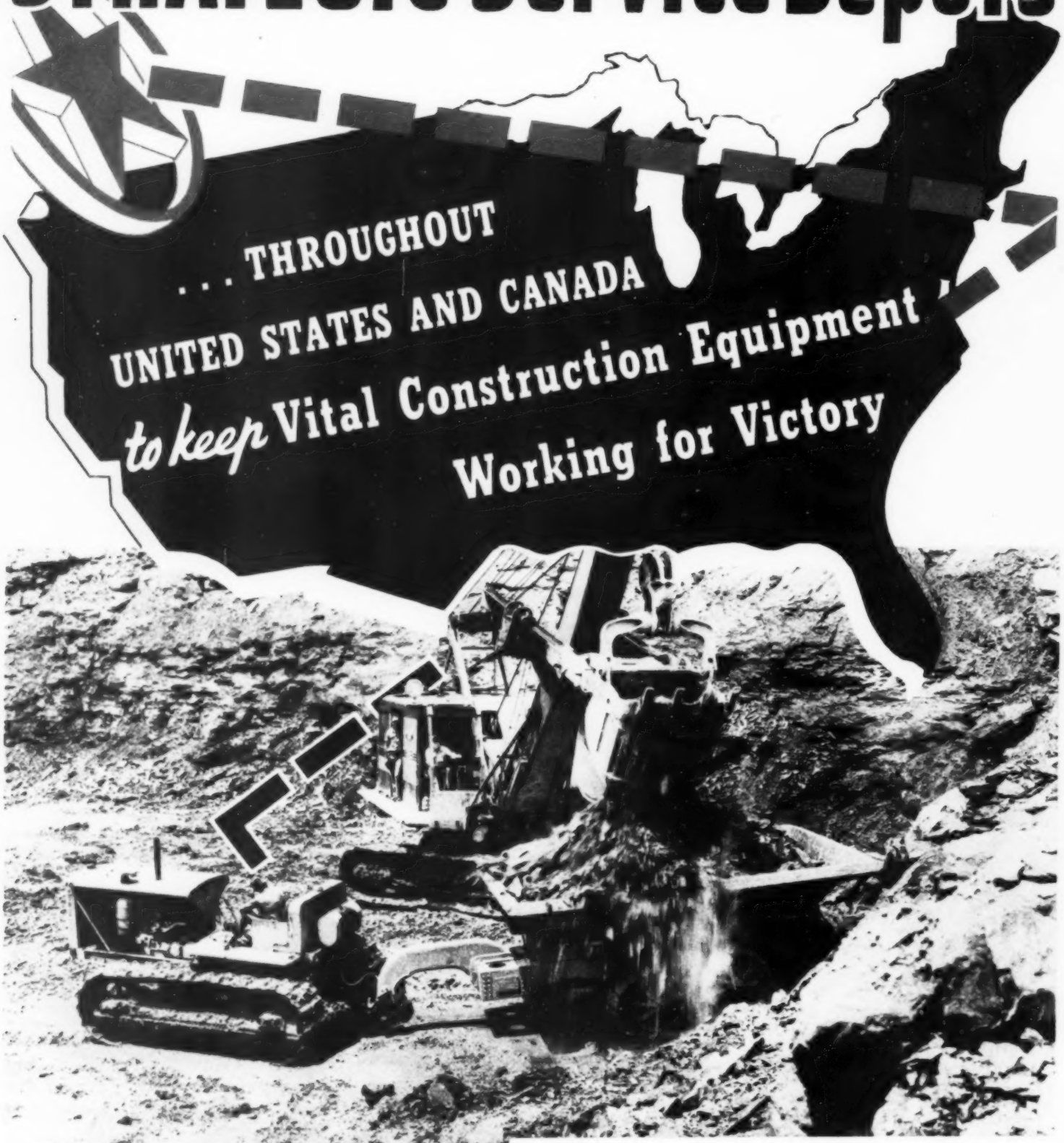
Cement suspended in water
DISPERSED
WITH POZZOLITH

Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above.)

BUILDERS

MASTERBUILT PRODUCTS

STRATEGIC Service Depots



AS Athey equipment fills a vital need in hauling dirt and rock, transporting pipe for pipe lines, moving war construction materials and supplies, Athey distributors serve dependably in their important tasks. From the unequalled Athey distributor organization you are assured helpful job-planning information and superior equipment service and repair.

Your Athey dealer is your "Caterpillar" dealer. Athey Truss Wheel Co., Chicago, Illinois.

ATHEY

BEFORE THE LAST BOMB FALLS . . .

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

American air bases have been bombed in this war and they will be bombed again. But they don't *stay* bombed. To the dauntless spirit of our Air Force ground crews and the machines at their command goes credit for the speed with which shattered runways are restored to service.

Almost before the last bomb strikes — while our fighter planes and anti-aircraft batteries are still taking vengeance in the sky — a helmeted soldier drives his "Caterpillar" Diesel Tractor on the field. He is master of a steel brute, rugged and powerful, built to conquer the toughest earth-moving jobs. In front of the great bulldozer-blade, tons of dirt and rock tumble back into bomb craters. And in a matter of hours — not weeks — the base is ready again.

"Caterpillar" Diesel Tractors, Motor Graders, Engines and Electric Sets are helping in the fight on hundreds of fronts. Everywhere they're saving men and the time and labor of men. They're breaking trails for troops, rescuing tanks, building and repairing military roads and landing fields, hauling big guns, powering searchlights and field telephones, clearing beach-heads, supplying main or stand-by power for Navy and Coast Guard craft.

The machines we make are on war duty. "Caterpillar" men will keep right on building them night and day, and "Caterpillar" dealers will keep right on servicing them so that they will deliver full power, for this one all-important purpose, until the big job is done.

CATERPILLAR *DIESEL*

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY U.S. WAR BONDS!

BATCH-CYCLE SPEED CUTS POURING TIME

3 THESE OPERATIONS REDUCE BATCH-CYCLE TIME . . .

Wide, Flow-Line, Quick Charging Skip Saves Seconds.

Air Controlled Discharge Chute is Positive, Quick Acting.

Twin-Door, Large Opening Bucket Dumps and Spreads at High Speed.

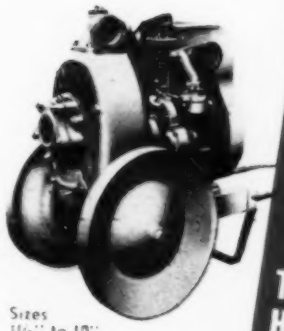
MAXIMUM YARDAGE KEEPS JOB MOVING

. . . Concrete slab jobs, today . . . airports, military highways and access roads . . . must be poured at top speed . . . men, equipment and materials . . . all striving to one end . . . smooth concrete highways and runways . . . in the shortest possible time. Koehring Paver batch-cycle speed helps meet production schedules. Batch-cycle is controlled by three important operations . . . charging, discharge and spreading. Koehring skip charges drum at high speed . . . drum interior quickly shrinks material . . . twin-door bucket spreads concrete without clogging delay. All operations are accurately and automatically batch-meter timed for maximum production.

KOEHRING COMPANY, *Milwaukee, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT



Sizes 1½" to 10"

CERTIFIED HIGH PERFORMANCE

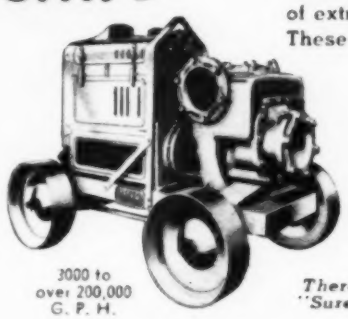
Every Jaeger Pump is Individually Tested and Guaranteed for Vacuum, Capacity and Pressure

THOUSANDS of EXTRA HOURS of SERVICE

for Your Future Protection as Well as Profit

Only JAEGER PUMPS

offer you factory-tested and certified high performance in units of extra heavy duty construction. These pumps are the surest protection your money can buy against pump breakdowns and job delays, the best insurance the contractor can have against the cost and uncertainty of early replacement.



3000 to over 200,000 G. P. H.

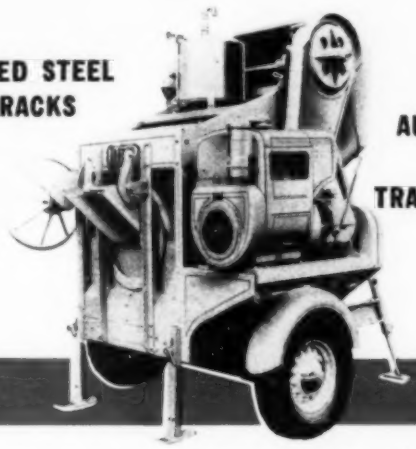
There's a size and type of Jaeger "Sure Prime" Pump to fit any job. Ask for Catalog.

THE JAEGER MACHINE COMPANY
800 Dublin Ave., Columbus, Ohio

CONTRACTORS' PUMPS, MIXERS, HOISTS, PAVING EQUIPMENT

MACHINED STEEL DRUM TRACKS

AUTOMOTIVE TYPE TRANSMISSION



Built to MIX FASTER

RUN SMOOTHER, QUIETER, LONGER

Put a Jaeger on the job and get those profits slower mixers can't produce. Load faster with Automatic Skip Shaker, mix more thoroly with Criss-Cross Action, discharge faster than any other mixer on market. Drums roll on machined tracks, chilled ball bearing rollers. Transmission runs in oil. All sizes trail easily on Timken bearings and pneumatic tires.

3½S with Measuring Batch Hopper

14S, 90" Skip

Send for Catalog. Compare Prices

THE JAEGER MACHINE CO.
800 Dublin Avenue, Columbus, Ohio
World's Biggest Manufacturer of Concrete Mixers. All Types, Sizes to 56S.

JAEGER SPEEDLINE

---

250 LINEAR FT. per HOUR of 25 FT. SLAB (MINUS 1" SLUMP 9"-6"-9" THICK)

with this JAEGER Screw SPREADER

and this JAEGER Type "H" FINISHER

Ferry & Pearson Laid Up to 135 Cu. Yds. an Hour, AVERAGED OVER 120 Cu. Yds. an Hour, Day after Day, on Murac Bomber Range, California

Record-Breaking Production of Denser, Smoother Slab—Fewer Men

On U. S. airport, near Ft. Wayne, James A. McKay & Sons report Jaeger Spreader-Finisher team was absolutely necessary to handle the very dry concrete in 25' width.

On 86 miles of 20'-24' slab, Koss Constr. Co. used 4 Screw Spreaders, report all engineers highly pleased.

On Ford's Willow Run Bomber Plant, 4 Jaeger Finishers placed 63 miles of 20' slab in 42 days.

On Higley Airport, Jaeger Team placed 362' per hour of 1½" slump concrete 12'6" wide without labor in front of machines and no trace of segregation.

Saved 3 to 5 men behind 34E dual paver, reports C. H. Atkinson Paving Co., Missouri.

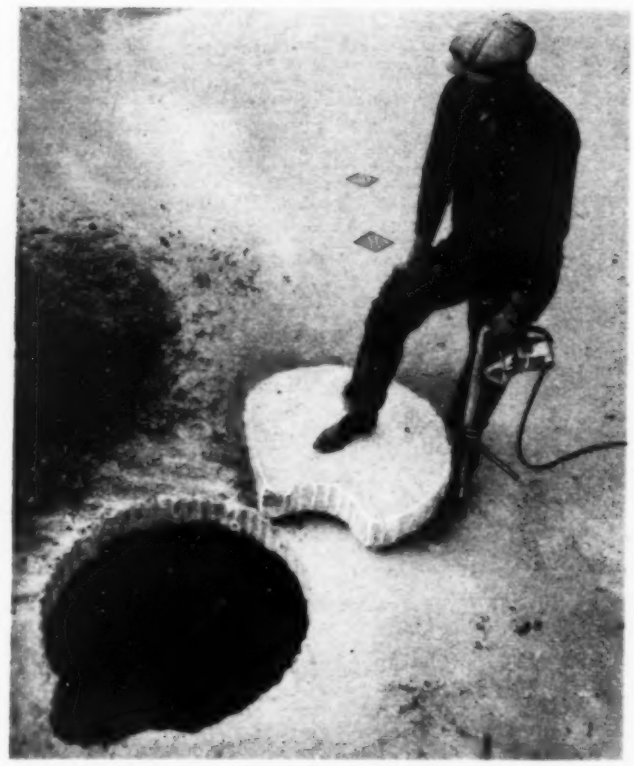
On Pennsylvania Turnpike Adam Eidemiller did 5160' in 14 hours, Tri-State Engr. averaged 4000 sq. yds. daily on 167,000 sq. yd. contract.

Spreader, equipped to both spread and finish, laid up to 150 tons hourly of bituminous resurfacing for Barber Construction Co., Chicago.

Ask Us for Contractors' Detailed Reports and Catalog

THE JAEGER MACHINE COMPANY
800 Dublin Avenue, Columbus, Ohio

HEAVY-DUTY Electric Drills with wood augers speed up the fabrication of roof trusses — one of dozens of construction uses for Black & Decker Drills.



POWERFUL Black & Decker Electric Hammers make quick work of breaking through paving to install manholes for service lines.

5 Ways Black & Decker *Tools* Help You Beat Schedules!

ROOF TRUSSES are quickly and accurately notched with Black & Decker one-hand QUICK-SAW at a large Army camp.

ELECTRIC NUT RUNNER fastens flange plate on heavy timber construction — speeds up similar assembly operations in steel and lumber.

1 They save *time* because Black & Decker Tools can be bought "on the job" from leading distributors in all principal cities.

2 They save *time* because Black & Decker Tools are easy to use—new men "take" to them quickly and easily.

3 They save *time* because Black & Decker makes the right size and capacity tool for every job—no need to "nurse" a weak tool or "wrestle" a monster.

4 They save *time* because Black & Decker Tools "stay on the job." Their quality insures more production — less breakdowns.

5 They save *time* because one of the Black & Decker 26 Factory-owned Service Branches is near your job to give you immediate "factory service" when repairs are necessary. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

HUSKY ELECTRIC HAMMER cuts opening through concrete wall — also drills and channels in stone or brick, vibrates concrete, removes form marks — faster, better and at lower cost than slow hand-hammering.

PROMPT TOOL REPAIRS are obtainable from Black & Decker's nation-wide chain of 26 Factory-owned Service Branches, to minimize "time-out" for repairs, give efficient service.

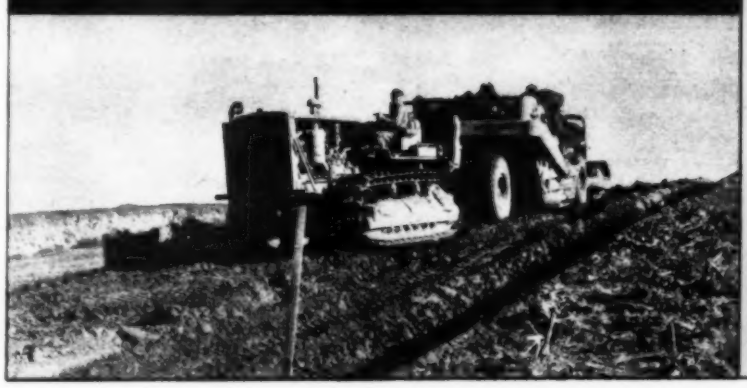
Leading Distributors Everywhere Sell

Black & Decker

PORTABLE ELECTRIC **TOOLS**

MUD...

on the home front
or battle front
won't stop
LAPLANT-CHOATE
EQUIPMENT



THESE machines, hundreds of them, are working on all fronts — at home on road and airport building, in the oil fields, on small and large construction projects — and at the battle front, building strategic roads, filling in bomb craters, carving out airports and scores of other jobs. They are doing these jobs because they can be depended on to get such jobs done. Into them has been built stamina, power *and* dependability.

But the war will end someday — and when it does, LaPlant-Choate wants to be able to serve you as always, with the best tractor tools and equipment they can build. Right now, there's a war to be won, and we are doing our best to help. We are building every piece of equipment we can turn out. Most of it, as you know, is going to the armed forces, because that's where it's needed most.

And there are some things we are doing — we and our dealers are making a real effort to help you keep your present machines moving. The LaPlant-Choate dealer organization is maintaining a skilled service organization, supplies of parts, and they are ready every hour of the day or night to help you. You can always depend on the dealer nearest you!

LAPLANT-CHOATE
Manufacturing Co INC.
Cable Address: "LAPCHOATE" Cedar Rapids Iowa, U.S.A.
EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT

Model FD Cletracs – 96 H.P. – operating Heil Hydraulic Scrapers

Model DD Cletrac – 61 H.P. – equipped with a Heil Bulldozer

★ In this war of production it is imperative that all machines be kept running. These Cletrac owners are cooperating by keeping all of their equipment in first class repair.

Model BG Cletrac – 38 H.P. – equipped with a Sargent Overhead Shovel

A Message

TO OWNERS AND OPERATORS OF ALL CONSTRUCTION EQUIPMENT

Winning the War depends on the maximum production of every individual and every piece of machine equipment in the United States. An hour lost today is an hour PERMANENTLY LOST—an hour which can never be regained.

You owe it to your country and yourself to keep your equipment working the greatest number of hours at MAXIMUM EFFICIENCY.

In order to MAINTAIN PEAK EFFICIENCY your machines MUST BE KEPT in FIRST CLASS CONDITION.

Because of the War's tremendous demand for critical materials there will be times when both dealer and manufacturer are unable to supply you immediately with certain repair parts.

Guard against costly delays. Make rigid inspections of your equipment at regular intervals.

Constant inspections by your dealer's trained service men or your mechanics will keep you informed of the condition of your machines. By anticipating your need for repair parts you will assist your dealer in his effort to maintain an adequate stock of repairs. By working closely with your dealer you may avoid the loss of valuable productive hours and the use of your machines for indefinite periods.

Talk to your dealer now about a regular schedule of planned inspections. Advise him of those parts you may need in the near future.

Anticipate the need of those parts which inspection shows will have to be replaced and then order them the minute you know what is needed to keep your equipment in first class operating condition.

"Keep 'Em Rolling!"

THE CLEVELAND TRACTOR COMPANY.

CLEVELAND, OHIO

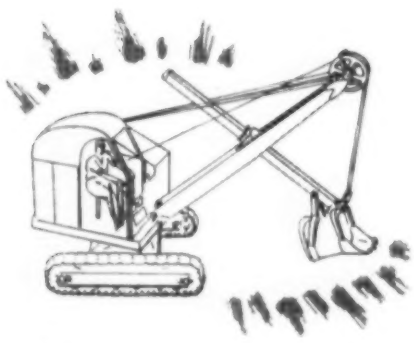
CLETRAC CRAWLER TRACTORS

18 TO 96 H-P

Gasoline or Diesel

KEEP YOUR SHOVEL *DIGGING* FOR UNCLE SAM

Good maintenance is especially important today when new equipment is hard to get and existing equipment is called on for high-speed 3-shift service. Here are a few simple rules that may help keep your shovel digging more for longer:



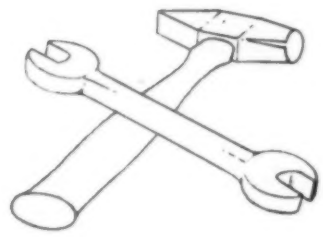
1. Lubricate regularly, following manufacturer's instructions carefully.

2. Keep machine clean.

3. Keep fuel, lubricants and radiator water clean.

4. Inspect machine at least every 6 shifts and tighten any loose bolts.

5. Fix troubles while they're still little ones. Don't let them grow.



6. Try to lay out work and drainage so machine works on dry footing.

7. Do not "sweep" the pit by sideways dipper motion.

8. Do not start swing until dipper has been hoisted or retracted clear of bank.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

Reprints of this ad are available for your bulletin boards. In the reprints, the Bucyrus-Erie signature is omitted to leave room for your own name. Write for your copies.

WHY

SHELL TALPEX*

Can Help You Keep Equipment Running at Peak Level

THERE are many lubricants which possess one or two characteristics necessary to the economical operation of Diesel and gasoline-driven equipment. But here is one lubricant that possesses all 4 characteristics . . . Shell Talpex. It has:

1. **HIGH DETERGENCY.** Helps keep carbon, lacquer and foreign particles from adhering to pistons and rings, valves, ports.
2. **EXCEPTIONAL OXIDATION STABILITY.** Minimum of sludge, lacquer and other deterioration products in cylinder and crankcase. Engine stays in clean condition.
3. **NON-CORROSIVENESS TO ALLOY BEARINGS.** Guards against corrosion of all lubricated engine parts.
4. **LOW CARBON FORMATION.** Reduces ring sticking and wear. Engine life is lengthened.

We've only high-spotted Shell Talpex for you. For full details see the Shell man. Let him show you how to keep 'em rolling . . . longer . . . at lowest cost.

***The New, All-Purpose, Heavy-Duty Lubricant**

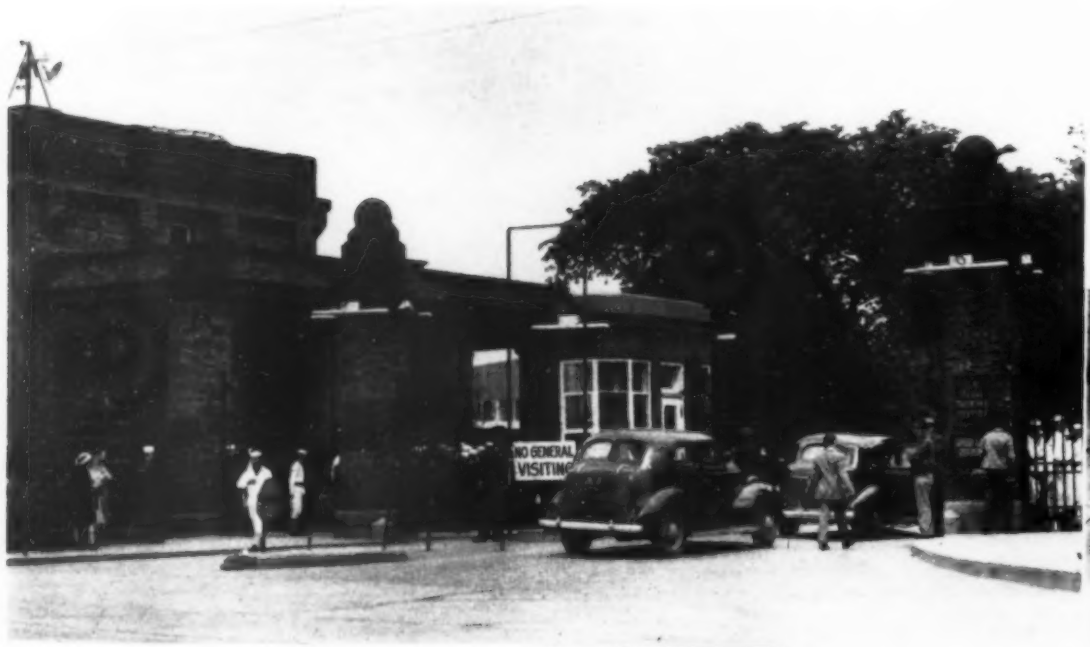
FOR TRUCKS - BUSES
TRACTORS - SHOVELS
STATIONARY & MARINE DIESELS

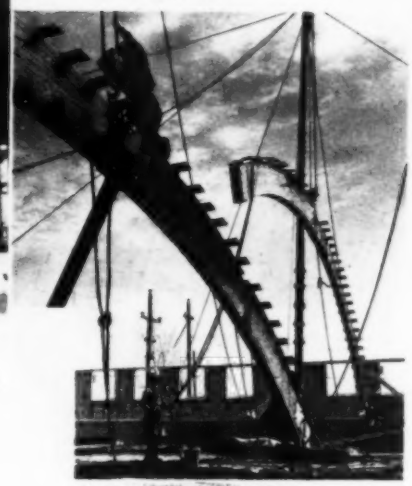
PASSENGER CAR USE PROHIBITED BY OPC RECOMMENDATION NO. 40, AMENDMENT.

OIL IS *Ammunition* - USE IT WISELY

SHELL

"More sailors? Aye, aye, Sir!"





In the expansion program going on full-speed behind the gates of the U. S. Naval Training Station at Great Lakes, new drill halls, barracks, shops, roads had to be quickly built. To help meet this need for construction speed, thousands of barrels of Lehigh Early Strength Cement have been used.

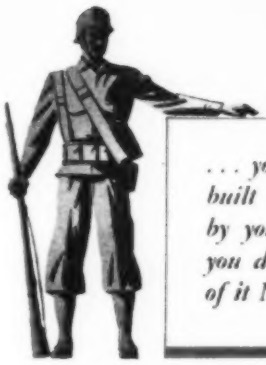
You know, of course, why Lehigh Early Strength Cement has been used in this and in so many other war-inspired projects. *To save construction time!* Concrete for foundations, roads, runways, piers—ready for service in 1/3 to 1/5 the normal time. Concrete ready for service, sometimes, overnight. For when Lehigh Early Strength Cement is used, you have service-strength concrete 3 to 5 times quicker than if normal cement had been employed. Though, in wartime, it is speed that counts, Lehigh Early Strength Cement offers many other advantages that peacetime construction finds important. For further information write to the Lehigh Service Department.

Lehigh EARLY STRENGTH CEMENT
for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.

In the Spirit of Today

HEIL Peacetime Production Now Serves a Wartime Need



. . . you can depend on your Heil quality-built earth-moving equipment to stand by you for the duration . . . provided you do your part by taking proper care of it NOW.

Heil hands that once produced equipment to fill your peacetime needs are now working tirelessly to produce more and more material of war, to help hasten the return of "business as usual."

Result is, your present equipment will have to last you longer and work harder—unless you are fortunate enough to meet governmental requirements regulating the purchase of new equipment.

Protect yourself and your investment by keeping your Heil equipment in good operating condition. Rely on your Heil distributor for genuine repair parts and workmanship up to the Heil quality-built standards.

Wherever possible, help conserve materials by welding, reinforcing, rebushing, and rebuilding your present equipment—it is your patriotic duty, as well as excellent insurance against breakdowns that may not only be costly, but irreparable.

While it is exceedingly difficult to provide you with new Heil Quality-Built Road Equipment "for the duration," it is our continued aim to provide you with the finest equipment to do a better job, quicker and at less cost, after the war.

Your Heil distributor is always ready to provide you with outstanding, prompt service on Heil Twin-Cable Scoops—Heil Hi-Speed Tractor Scoops—Heil Trailbuilders and Bulldozers—Heil Tamping Rollers—and Heil Hydraulic Dump Units. Call on him to help you keep your equipment operating.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WIS.

PRACTICAL METHODS OF LUBRICATING YOUR WIRE ROPE

. . . to help you get longer service . . . to help you conserve steel

The benefit derived from systematic lubrication of wire rope is one of those apparently intangible things that are difficult for the average user to find among his many operating problems. However, laboratory and scientifically controlled field tests have proved that wire rope, like any machine part, lasts longer if it is kept well lubricated.

What are some simple ways to lubricate wire rope on your job?

Preparation

It is very desirable that the rope be clean and dry. A jet of air, steam, or wire brushing, followed by a period in which the rope is allowed to dry, are some of the methods used preparatory to applying the lubricant.

First, you can brush the lubricant on to the rope

FIG. 1

Illustrated, in Figure 1, is one easy and effective method of applying lubrication. Dip the brush into the lubricant and apply. In some cases a rag or piece of sheepskin is dipped in the lubricant and used to swab the lubricant on to the rope.

Applying by hand with leather gloves

FIG. 2

Another simple method is shown in Figure 2. Leather is preferred to canvas, because of its greater protection and less penetration of the grease.

This method is especially good where a heavy, non-flowing lubricant is applied. It is often desirable to heat lubricant slightly to get a smoother, better application.

You can make a simple lubricating device

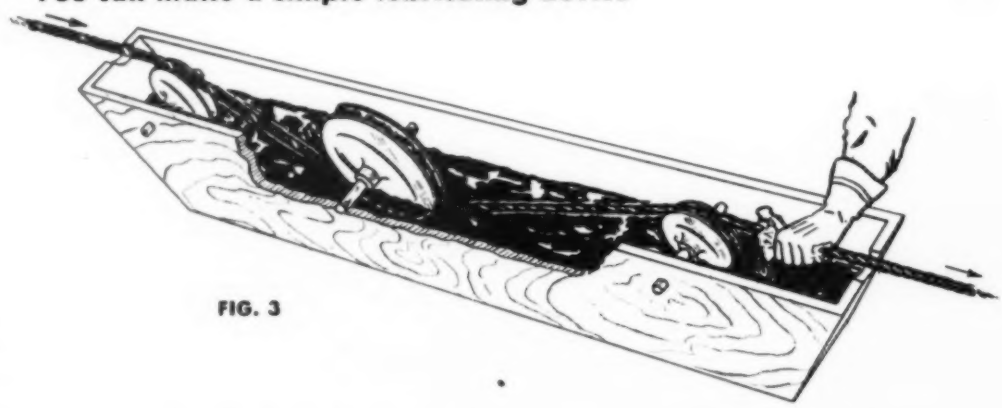


FIG. 3

A wooden trough with a sheave mounted on a shaft does a good job.

Such a trough, or slush box, is illustrated in Figure 3. The rope is run over the end of the trough, under the sheave, and out the other end so that the rope runs through the lubricant. A rag or swab held in place at the outgoing end wipes off excess lubricant. A slush box for vertical ropes is shown in figure 4.

Proper lubrication helps to seal in the Macwhyte internal lubrication that covers each wire during the manufacture of the rope. It helps to keep out water and dirt, and guards against corrosion.

Regular inspection of the rope with frequent applications of lubricant produces better results than heavy coatings less frequently applied.

The methods illustrated are those in most common use and cover most wire rope applications. Various methods used in service often depend upon the particular type of lubricant and whether it is applied hot or cold.

The use of wire rope varies so greatly that it is not possible to set forth here any particular types of lubricant to use. Macwhyte engineers are always glad to give you the benefit of their experience in special cases.

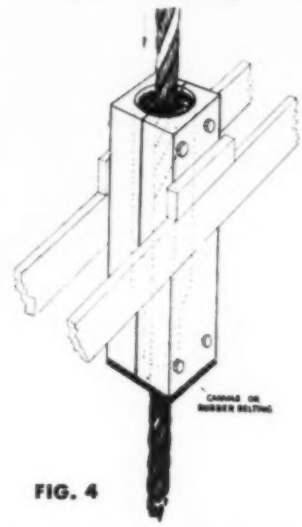


FIG. 4

This is number 12 in a series of informative articles prepared by the Macwhyte Wire Rope Company. All articles in this series are available on request.

MACWHYTE COMPANY
2940 Fourteenth Avenue • Kenosha, Wisconsin
Mill Depots:
New York • Pittsburgh • Chicago
Ft. Worth • Portland • Seattle • San Francisco
Distributors throughout the U. S. A.

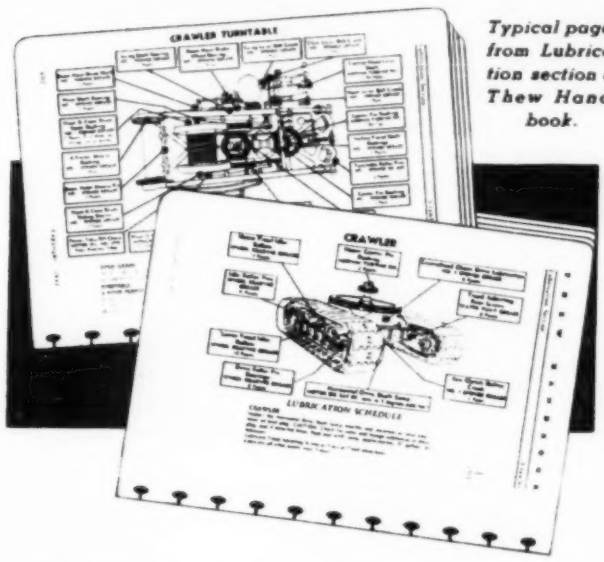
Macwhyte Company Manufactures:
MACWHYTE PREformed and Internally Lubricated Wire Rope
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie Rods

NO. 641

Macwhyte's premier wire rope, famous for its strength, toughness, and internal lubrication.

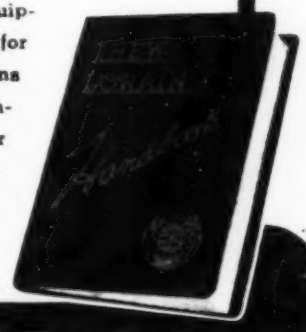
"Gun" your LORAIN- 24 HOURS A DAY*

Give it the "Gun" (grease) and add years to the life of your equipment



Typical pages from Lubrication section of Thew Handbook.

All types of equipment need frequent and proper lubrication to prevent damage, delays and expense. One hour set aside in each day's schedule for this purpose will prolong the life and maintain the performance of your equipment. Lorain owners should write today for a copy of the Thew Handbook. It contains diagrams of lubrication points and recommended schedules for *all parts* of your Lorain as well as instructions on operation, adjustment and care. Give Lorain model and serial number when writing.



THEW-LORAIN

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

But take care of it, too!

It's "all work and no rest" for most Lorain machines these days—tough, round-the-clock jobs that *must* be finished so the next one can be started. Sure, it's a strain on the equipment but Lorains are built with the care and skill that lets them soak up extra work.

So we say, "gun" your Lorain but take care of it, too. A little extra care and service will prolong its life still further and ***help you do more with what you've got.***

LORAIN headquarters are in the field

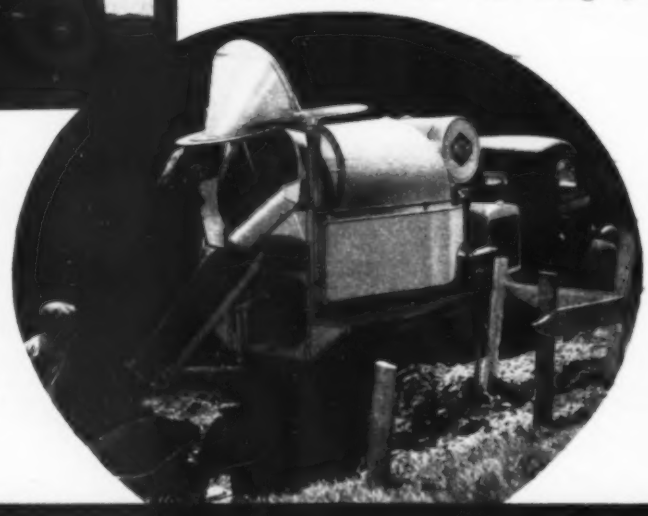
There is a Lorain distributor near you who can help make your equipment last longer and work faster. Many distributors carry a representative stock of genuine Thew-Lorain ***factory-made parts.*** They have facilities for ***rebuilding*** machinery and know how to rebuild it properly; they can furnish ***on-the-job field service*** for repairs and replacement; they can serve as a ***clearing house*** for information on rentable equipment or booms you may need for converting present machines. Call on them often.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

"What-Back Already? . . . I HAD NO IDEA OUR SMITH-MOBILES WOULD SAVE SO MUCH TIME!"

● Ready Mixed Concrete Operators frequently express surprise that their Smith-Mobiles mix and deliver concrete in such relatively short time . . . *faster than any previously owned truck mixers.* And yet, it's really no surprise at all. Smith-Mobiles have every modern time-saving feature . . . eliminate many tedious operations . . . give you the fastest batch cycle in the industry. Today — SPEED is an important factor — especially on big U. S. Defense jobs. So why plod along with slow, obsolete equipment? Buy modern Smith-Mobiles. Write for Catalog 198-B.

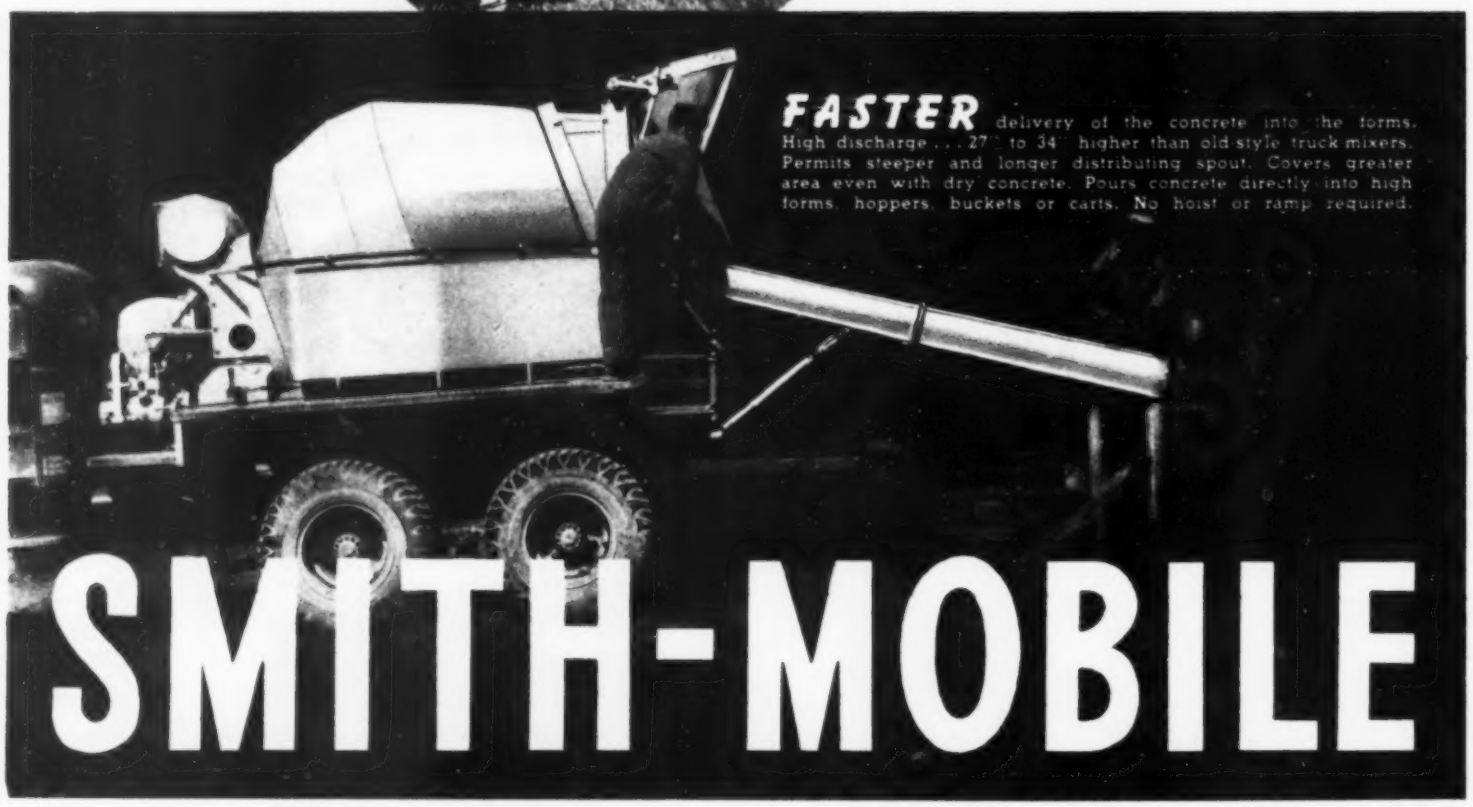
The T. L. SMITH CO.
2851 N. 32nd St., Milwaukee, Wis.



FASTER charging because Smith-Mobile has a large, roomy charging chute that makes it easy to spot mixer under bin gates. No troublesome, leaky hatch to open or close. Driver can stay in cab. Water is introduced thru feed opening. No clogged water bells buried in concrete.

●

FASTER and better mixing. Shrinking and mixing start the instant the batch enters the drum, because the drum rotates during the charging operation. Scientific blade design produces positive "end-to-end" movement of aggregates. Sealing door can be opened wide during mixing cycle. You can look in drum and actually SEE what's going on.



FASTER delivery of the concrete into the forms. High discharge . . . 27" to 34" higher than old style truck mixers. Permits steeper and longer distributing spout. Covers greater area even with dry concrete. Pours concrete directly into high forms, hoppers, buckets or carts. No hoist or ramp required.

SMITH-MOBILE

2-CYCLE DIESEL

It's Husky! It's Sturdy! It's Tough!

It's the most outstanding Diesel in the construction industry, this hard-hitting, double-powered, 2-cycle engine. It "packs a real wallop" that carries it through the toughest going—it gets in there and lugs where ordinary engines stall—and it keeps on purring along without constant nursing and attention, a full sixty minute hour . . . 24 hours per day . . . if necessary.

Service records indicate thousands of hours of operation without overhauls or major repairs on tough, three shift jobs. That's the kind of service Allis-Chalmers tractor owners are getting from their 2-Cycle Diesels. It's the kind of performance that gets jobs finished on time and at less cost — the kind of performance you've always wanted in a tractor engine — the kind of performance only a 2-Cycle Diesel can give you.

If you are not already a 2-Cycle Diesel owner, it will pay you to check up on this modern power. Be prepared for the future. Write for complete information.

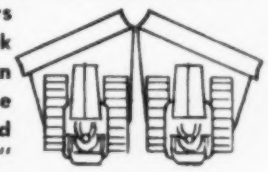
ALLIS-CHALMERS
TRACTOR DIVISION MILWAUKEE, U.S.A.

2-Cycle THE MODERN DIESEL POWER

JOB SHORT-CUT WINNER

$5 to Fred Goett, 841 E. 67th St., Seattle, Washington, for the Following Short-cut Method:

"One winter we had a pile of muck to get off the grade. It was too deep to get a tractor through it. All we could do was push it up a little and that made it worse. So we took two A-C's, one HD-10 and an LO, both with angle dozers. We angled the blades and worked the machines side by side. The blades were angled so they formed a point (illustration). The two angle dozers went through the muck pile and worked it down to solid footing so the other dozers could get rid of it. It worked good."



• • •

You, too, can win $5 and at the same time help the war effort! Send in your Job Short-Cut suggestions and ideas on How To Make Tractors and Graders Last Longer. Allis-Chalmers will pay $5 for each suggestion accepted for publication in future advertisements.

3/8 TO 3 YARD CAPACITY

LINK-BELT SPEEDER

SHOVELS – DRAGLINES
CRANES

STRIPPED

STRIPPED for Action

● Here is a stone quarry being readied for productive work. Rock, tree stumps and overburden have to be removed. The quarry has to be stripped for action. A tough job which calls for a powerful, tough shovel.

A Link-Belt Speeder shovel has been doing this work for many months now, 10 hours per day. There has been no interruption of work—just a steady, dependable cycle of fast, positive digging.

Link-Belt Speeder shovels—like the stone quarry—are also stripped for action. However, unlike the quarry they don't have to be readied for the job—they have been built "Stripped For Action". Trim, husky machines—stripped of all unnecessary machinery and weight—powerful units of "fighting gear" for Uncle Sam's contractors.

Today Link-Belt Speeder shovels, draglines and cranes are working on war construction fronts all over the world—they are known everywhere for proved ability, reliability and record-breaking output.

8934

LINK-BELT SPEEDER CORPORATION

Builders of the Most Complete Line of Shovels and Cranes

301 WEST PERSHING ROAD • CHICAGO, ILLINOIS

This May Be America's Lifeline

SLASHING through forests and underbrush, pulling stumps by the thousands, ploughing hub-deep mud, they're pushing the Alaska Highway through . . . mile after mile . . . a titanic task being rushed to completion at incredible speed.

During the war the Alaska Highway may prove to be America's lifeline. After the war it may be your family's vacation boulevard.

To build this highway through bleak Canadian wilderness men must fight swamps and marshes, swarming insects, cold that last winter averaged 30° to 50° below zero! It's a job for real men—and a job for real tires on the hundreds of trucks and pieces of special roadbuilding equipment.

You men in the construction business probably know of the leading role of B. F. Goodrich research in the development of such "tough job" tires for all types of equipment on which modern construction technique depends. B. F. Goodrich developed tires with special treads to protect against rock-cutting, tires to provide extra traction in mud and soft soil and many others designed to do specific jobs on construction projects.

B. F. Goodrich now supplies both passenger and truck tires for essential civilian use as well as for military purposes. Tires which aid conservation by providing more mileage per pound of rubber. We do not ask you to buy tires today. Instead we say, guard your tires carefully, make them give the last final mile of service for your country.

When you *must* buy, get good tires. B. F. Goodrich Speedliner Silvertowns for trucks and buses have an amazing record for long mileage in all types of service. They are built with a broad, flattened tread construction. They're made with Duramin, the famous B. F. Goodrich discovery that keeps rubber young. Two of many reasons for extra miles.

Free TIRE GUIDE!

Describes each off-the-highway tire in detail, tells the type of service it's designed for, and the type of equipment it's to be used on. Gives tips on tire care and tire maintenance that will help you conserve rubber and save money. For your *free* copy write The B. F. Goodrich Company, Dept. T-119, Akron, Ohio, *today*.

BFG
Earth Service Silvertown
The last word in surefooted traction. Jumbo cleats form a balanced, non-skid, self-cleaning tread design.
Rock Service Silvertown
Rugged, closely-knit tread resists cutting. The best tire for quarrying, strip mining, rock excavating.
Universal Super Traction Silvertown
Gives universal traction forward and backward. Extra-heavy tread and sidewalls for resistance to cutting.

In war or peace

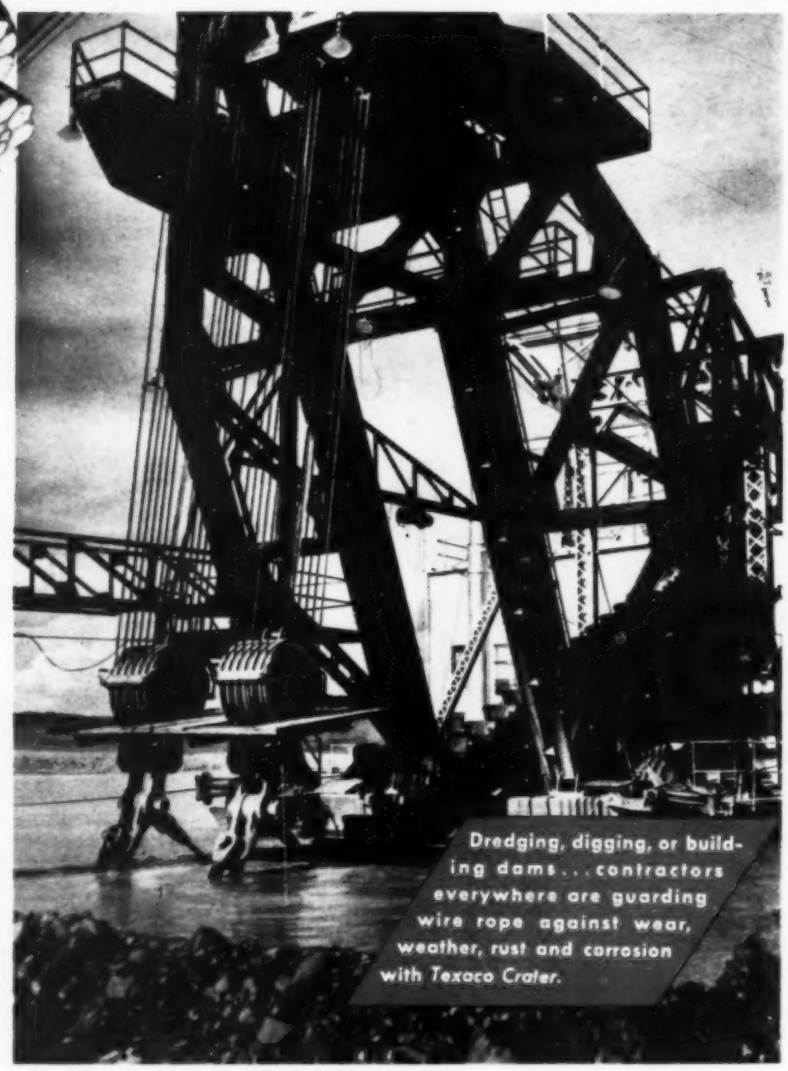
B.F.Goodrich

FIRST IN RUBBER

★ ★ TRUCK OWNERS—JOIN THE U. S. TRUCK CONSERVATION CORPS ★ ★

Longer Rope Life

THE INSIDE STORY



Dredging, digging, or building dams . . . contractors everywhere are guarding wire rope against wear, weather, rust and corrosion with *Texaco Crater*.

NO MATTER HOW SEVERE the conditions on construction jobs, you can count on longer, uninterrupted service from your wire rope . . . when you protect it with *Texaco Crater*.

Texaco Crater completely penetrates wire rope, preserving the core, coating each wire in a tough, viscous, lubricating film. It cuts down internal and external wear, seals out moisture, prolongs rope life.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write to:

The Texas Company, 135 East 42nd Street, New York, N. Y.

Care for your Car ..for your Country

Tune in the TEXACO STAR THEATRE every Sunday night—CBS

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

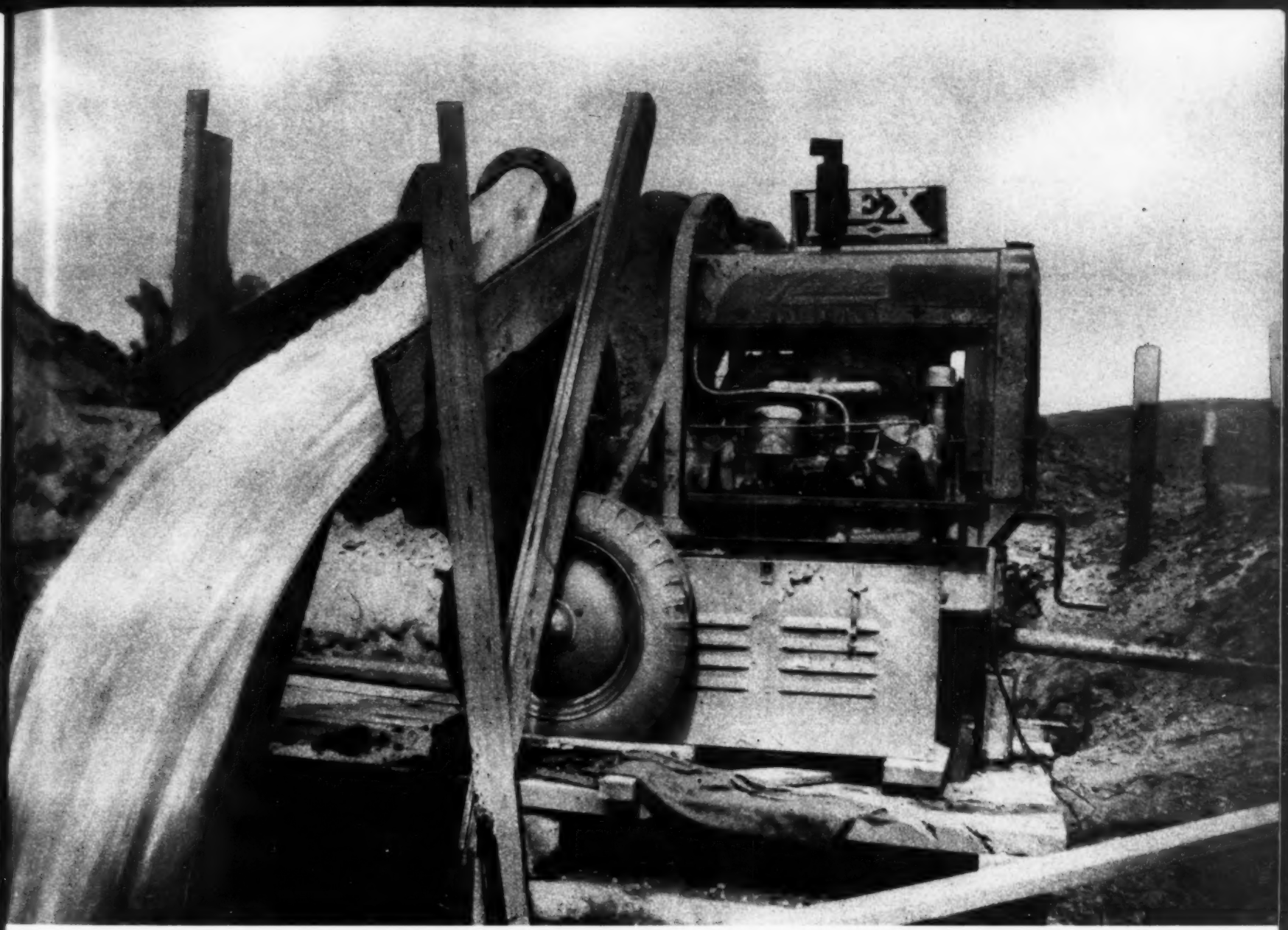
★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

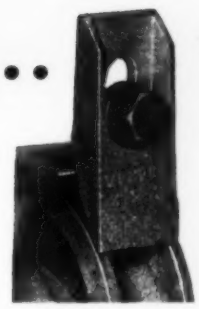
TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



THESE PUMPS CARRY KNIVES... to Peel Air!



There is a pump that can prime as much as 50% faster than others—and operate efficiently in the face of leaks that would stop ordinary pumps. It's the Rex Speed Prime Pump with the exclusive, patented Rex Air Peeler.

WITH a Rex Speed Prime Pump you "start the motor and forget the pump." You have no worries about priming or re-priming, no concern about fluctuation in the volume of water being handled. Rex, thanks to the revolutionary Air Peeler, moves all the volume all the time.

The Air Peeler is a sturdy knife-edged blade of Rex Z-Metal, mounted directly above the Rex impeller. During the priming operation, air is forced to the outside of the impeller vanes—literally peeled from the impeller just as you would peel an apple. Then this air escapes through the discharge opening which greatly accelerates the pump's priming time.

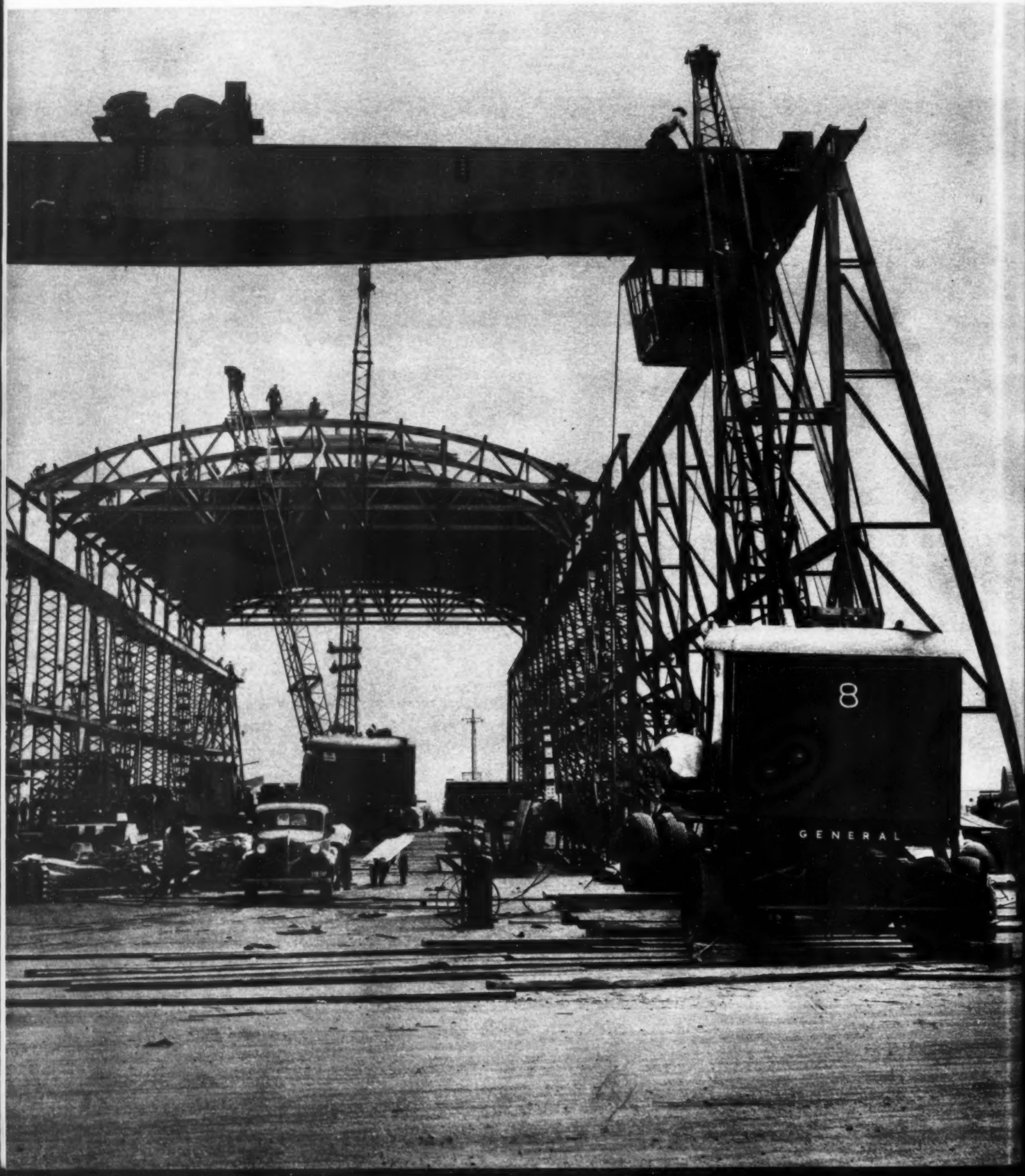
Of course, this is just one of the exclusive features that have made Rex Speed Prime Pumps famous in the construction industry. Other reasons—and a showing of the full Rex line from the amazing 57-lb. Rex Jr. 3-M to the big 125-M type—are given you in "Facts You Should Know About Rex Speed Prime Pumps."

Write for Bulletin 400. Chain Belt Company, 1664 West Bruce Street, Milwaukee, Wisconsin.

REX **SPEED PRIME PUMPS**

CHAIN BELT COMPANY OF MILWAUKEE

No Wonder Kaiser Co. Inc. Shipyards with 12 GENERAL SUPERCRANES

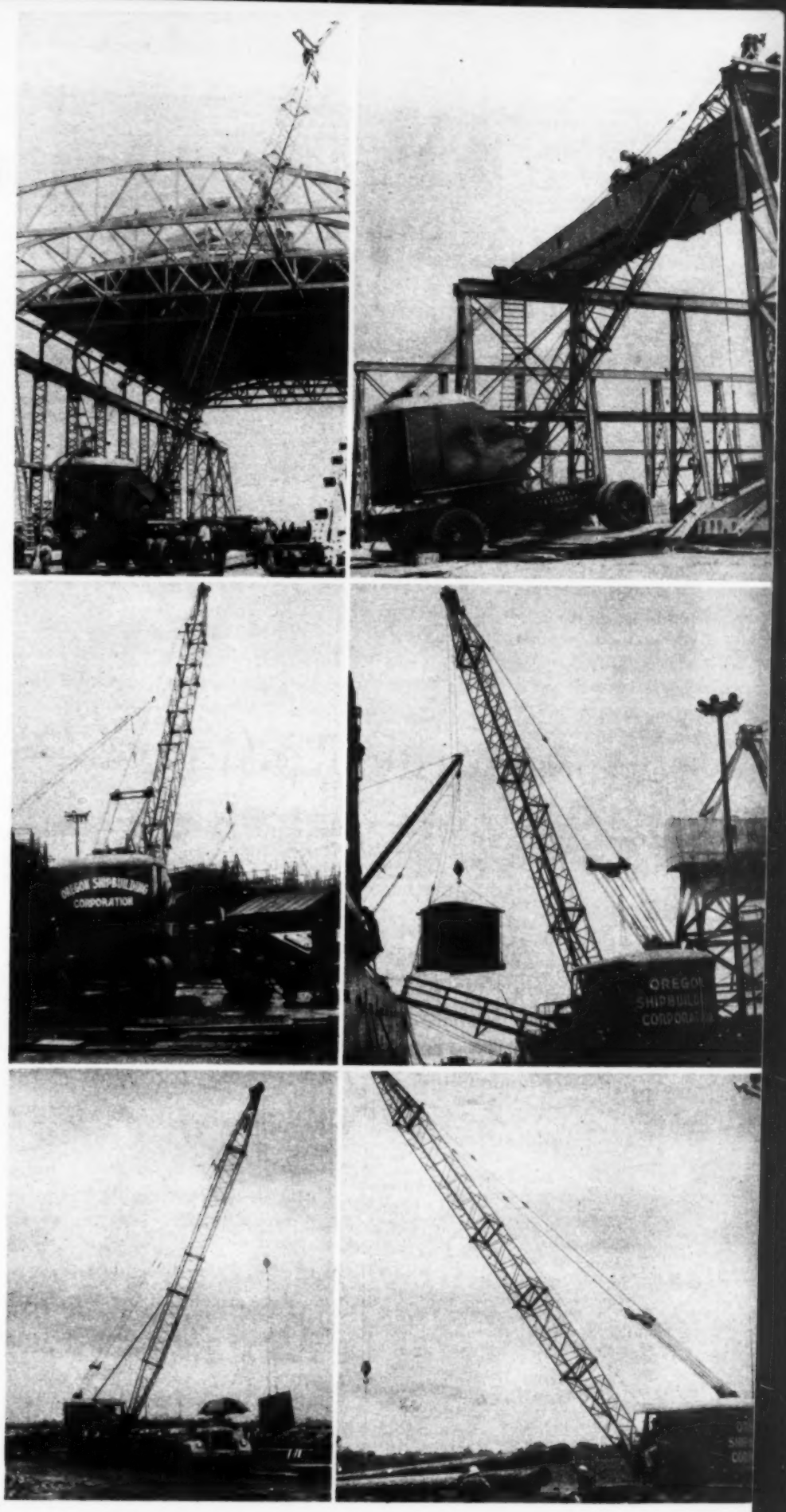


Make Speed... In Command!

Speed—Speed—and More Speed in building ships for America's Merchant Marine is the never-ending objective of Kaiser Company, Inc., shipyards. At Oregon Shipbuilding Corporation and at the Vancouver, Wash., shipyards, new speed records are being hung up daily . . . and are being broken again almost as fast!

One secret of Kaiser shipbuilding success is the ability to fully utilize the maneuverability, speed and weight-lifting capacity of modern rubber-tired cranes. Spearheads of the materials-handling crane fleet at the Vancouver and Oregon Shipbuilding Corporation plants are twelve GENERAL SUPERCRANES. Anywhere you look, you'll find these ultra-modern machines at work—making layouts, carrying stiffeners, storing steel forms and plates, working along shipside and at the assembly platforms, erecting steel and roof trusses on new buildings under construction.

It's this ability to adapt itself to any task and do it better—that puts the Super in Supercrane. Productive capacity on Supercrane is still sold to the limit, but investigate its advantages now . . . for your future needs.



GENERAL SUPERCRANE

WHY SUPER? Because it is better!—Because it requires but one operator, and one engine—conserves vital manpower, vital fuel and vital machinery—mounted on rubber tires and self propelled it speeds from job to job without damage to floors or runways—affords a new conception of "precision" load control.

The **OSGOOD** COMPANY

Sizes: 1½ to 2½ Cu. Yd.
Diesel - Oil - Gas - Electric

Associated with
The GENERAL EXCAVATOR CO.

The **HERCULES** COMPANY

HERCULES
IRONEROLLERS
6 to 12 Tons
Diesel or Gasoline

Associated with
The GENERAL EXCAVATOR CO.

GENERAL

OSGOOD MARION OHIO U.S.A. GENERAL HERCULES

Sizes:
3/8-1/2-5/8-3/4 Cu. Yd.
Diesel—Gas—Electric

SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted

THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

"Praise the Lord and *Pass the Ammunition*"

THIS Pearl Harborism,* uttered by a fervent Navy chaplain, will live in our school books long after today's headlines and swaying battle lines have passed into history.

It exactly expresses the unique combination of the spiritual and the practical which is inherent in our national character.

. . And America IS *passing the ammunition.* Starting with an atrophied military explosives industry in 1939, the Production for Defense program had raised the rate of "passing the ammunition" by 1400% at the time the chaplain spoke.

▶ Since then, according to an official statement of Donald Nelson:

"Explosives and ammunition are being made at many times the rate of last year as newly constructed plants come into operation. TNT is being made at a rate five times that before Pearl Harbor. Smokeless powder is being produced at a rate almost twice that before Pearl Harbor. One new plant is making more TNT today than the entire explosives industry produced in peacetime and there are several of this type of plant."

Incendiary bombs are vital ammunition in the kind of war we are in. America's chemical industry is far ahead of schedule in passing along that potent ammunition.

Magnesium is part ammunition, part construction material. You know it's now being taken from sea-water, but do you know that we are making at least 100 times as much magnesium now as we did in 1938?

100-octane gasoline isn't ammunition, but it's handy to have around in a war, because bombers using this product of American chemistry can carry an extra ton of what it takes to win.

Synthetic rubber is another necessity in passing the ammunition. The Chemical Industry faces the staggering job of producing more rubber than all the rubber trees in the world were able to pour into the American market prior to the war . . . 875,000 tons per year by 1944 is the goal. Those of us who have seen tank-factories and shipyards grow faster than the corn-crops they replaced believe the Chemical Engineers of America will do the job.

What is the secret of these amazing modern counterparts of the frontiersman's ability to turn from peace to war?

▶ One of the important answers is Chemical Engineering. We just naturally have more men and more machines that know how to make a molecule behave than any two nations on earth.

Starting after World War I, our chemical engineers used the experience gained in guncotton factories to develop the vast peacetime Chemical Industry which gave you rayon, lacquer, transparent wrapping paper, plastic telephones, knockless gasoline, shatterproof glass, synthetic vitamins, laboratory-fathered medicines, plastic tips for your shoe laces, nylon hosiery, and thousands of other comforts to help you live a peacetime Life of Riley.

This vast activity of making life more livable for peaceful Americans had created an enormous pool of management and production men in our chemical industries.

When war came, these men answered their country's call, by rearranging their peaceful atoms into bellicose molecules that would explode, fly, float, shoot or stop a bullet.

Today, fertilizer, salt, whiskey, rayon, even pine stumps are being turned into products of unrecognizable ferocity.

▶ When the war is over, it will be the imagination of the Men of Chemistry that will set our great new war-chemical plants upon a new era of peacetime fruitfulness. Even while the chemical engineer is breaking production records for war, he is planning for a peacetime production that will revert these molecules toward serving our daily lives. Chemical Warfare will become Chemical Welfare, through Imagination.

* * *

In recognition of the miracle of war production—accomplished through the cooperation of American management and labor with the W.P.B. . . . this 7th in a series of newspaper advertisements is published by the McGraw-Hill Network of Industrial Communication.

*Also title of Gene Lockhart's famous fighting song of World War II

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42ND STREET • • NEW YORK

This advertisement appears in a group of newspapers on Wednesday, September 9, 1942

. . . . . and pass the INFORMATION

WHEN an American gunner calls for ammunition, whether he wears a cross—like the chaplain in our newspaper advertisement—or a tattooed mermaid, he sets in motion the mightiest war-machine on earth . . . American Industry.

Knitting together all the industries of America, making it possible for them to turn *quickly* from peace to war, is the Industrial Press.

When the gunner yells for AMMUNITION, industry yells for INFORMATION. It is the job of the industrial magazines to supply it.

"What do we do when we can't get stainless steel for a Toluol recovery plant?"

"Which is the best section of the country for locating our new plant, considering power supply, bombing range and transportation?"

"How can we step-up the alcohol output of our stills, without using scarce metals?"

"What's the best method of training 18,000 green hands to get quick operating efficiency?"

These are typical of the questions that flow over the desks of our editors day after day.

They keep nearly 900 McGraw-Hill editors and engineer-correspondents busy, making field calls, finding the best answer to each problem and reporting the results to management and production men.

Industrial advertisers supplement this work by showing how their products meet specific needs.

This constant interchange of information is part of the strength and adaptability of American Industry.

It is so important that executives are surveying their organizations to make sure that the supply of Industrial Magazines is adequate.

If you would like suggestions as to how to conduct such a survey, write to The Reading Counselor, McGraw-Hill Publishing Company, Inc.

* * *

THE McGRAW-HILL NETWORK

23 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents . . . More than 1,000,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

THE McGRAW-HILL BOOKS

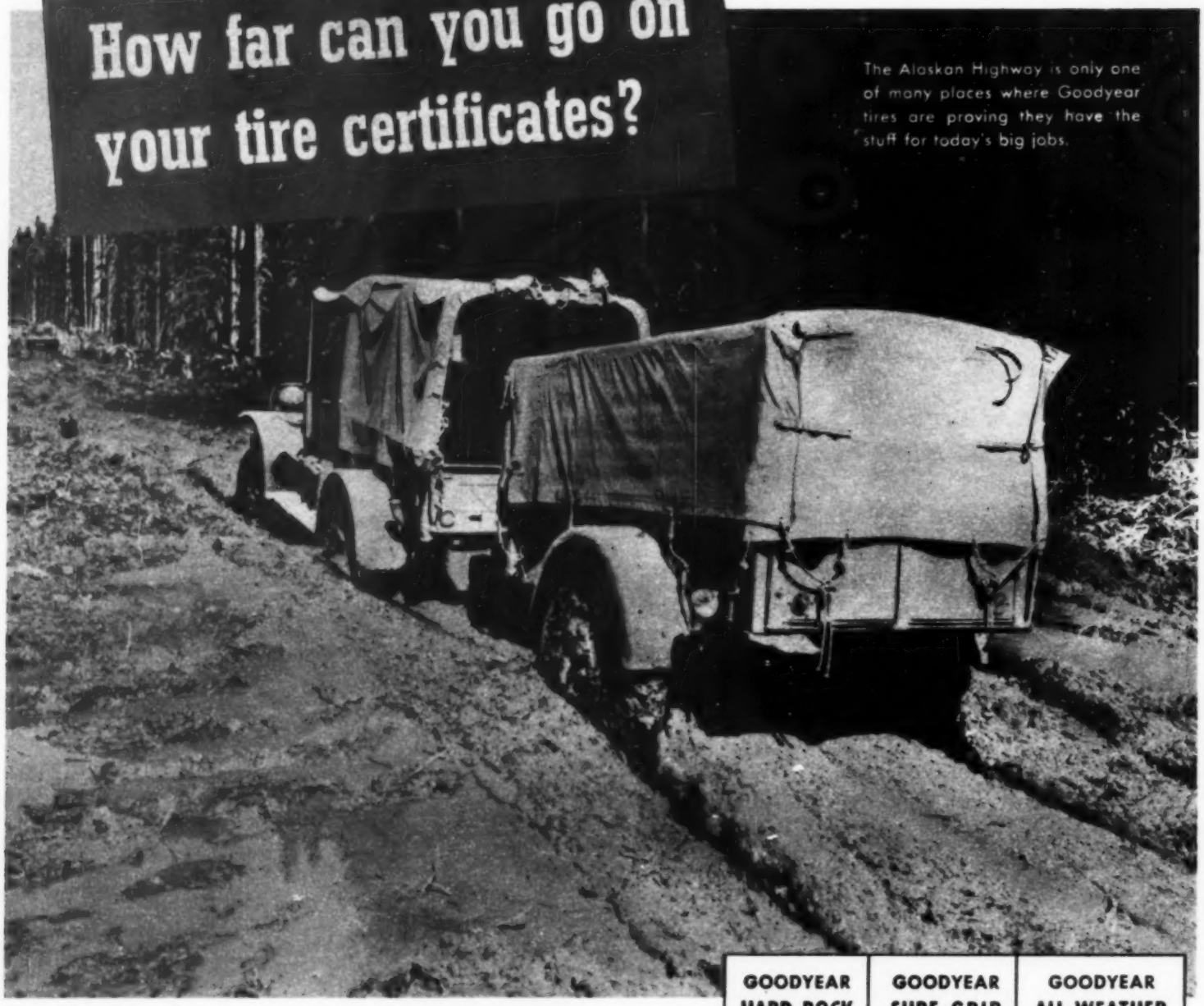
Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42nd STREET · NEW YORK

THE McGRAW-HILL NETWORK OF INDUSTRIAL PUBLICATIONS

American Machinist
Aviation
Bus Transportation
Business Week
Chemical & Metallurgical Engineering
Coal Age
Construction Methods
Electrical Contracting
Electrical Merchandising
Electrical West
Electrical World
Electronics
Engineering & Mining Journal
E. & M. J. Metal and Mineral Markets
Engineering News-Record
Factory Management & Maintenance
Food Industries
Mill Supplies
Power
Product Engineering
Textile World
Transit Journal
Wholesaler's Salesman

How far can you go on your tire certificates?



The Alaskan Highway is only one of many places where Goodyear tires are proving they have the stuff for today's big jobs.

Farther than you think, if you pick the right tires

NOBODY has a sure-fire answer to the growing rubber shortage. But a great many contractors have found that the best protection against future uncertainties is to buy the longest-wearing tires they can get — right now.

So now — as for more than twenty years past — they're buying more Goodyear tires than any other kind.

There are two sound reasons for the long-continued preference of these tire-experienced men for Goodyears.

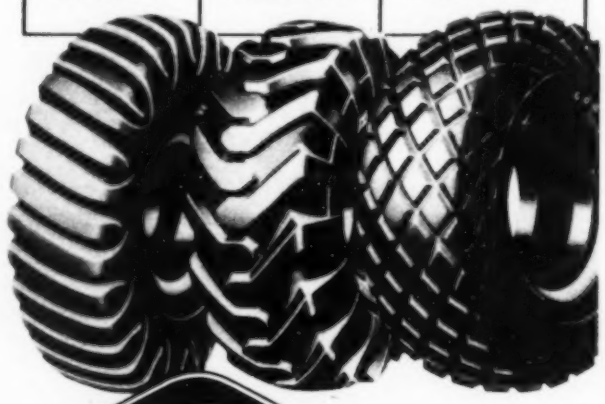
For one thing, their records through the years prove conclusively that Goodyears deliver the most miles per dollar — before and after recapping.

Secondly, Goodyears provide greater traction because they're equipped with special treads for every type of operation — rock, mud or dirt.

Don't gamble with your tire certificates. Pick out the Goodyear that fits your job and see your dealer about it today.

***P.S.** Goodyear's free Truck Tire Engineering Service helps you with answers to questions on Rationing Regulations. And Goodyear dealers can arrange for recapping all sizes of off-the-road tires by factory methods that insure maximum extra service.*

GOODYEAR HARD ROCK LUG for all rock work	GOODYEAR SURE-GRIP GRADER for mud and marsh	GOODYEAR ALL-WEATHER EARTH MOVER for drawn dirt-movers



GOODYEAR
THE GREATEST NAME IN RUBBER

All-Weather — T. M. The Goodyear Tire & Rubber Company

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

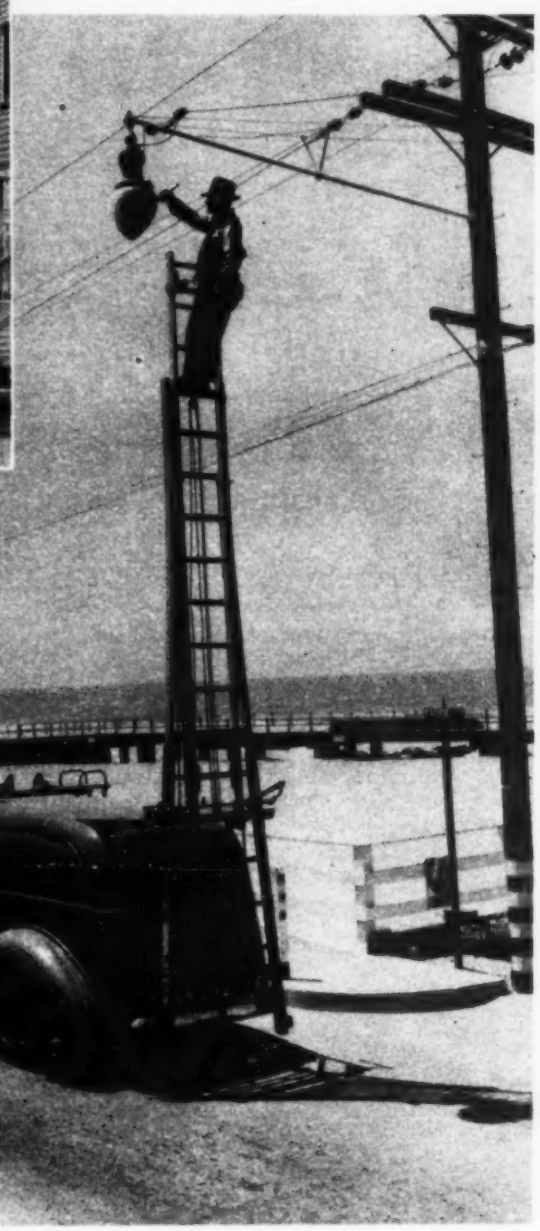
Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24 | SEPTEMBER, 1942 | Number 9

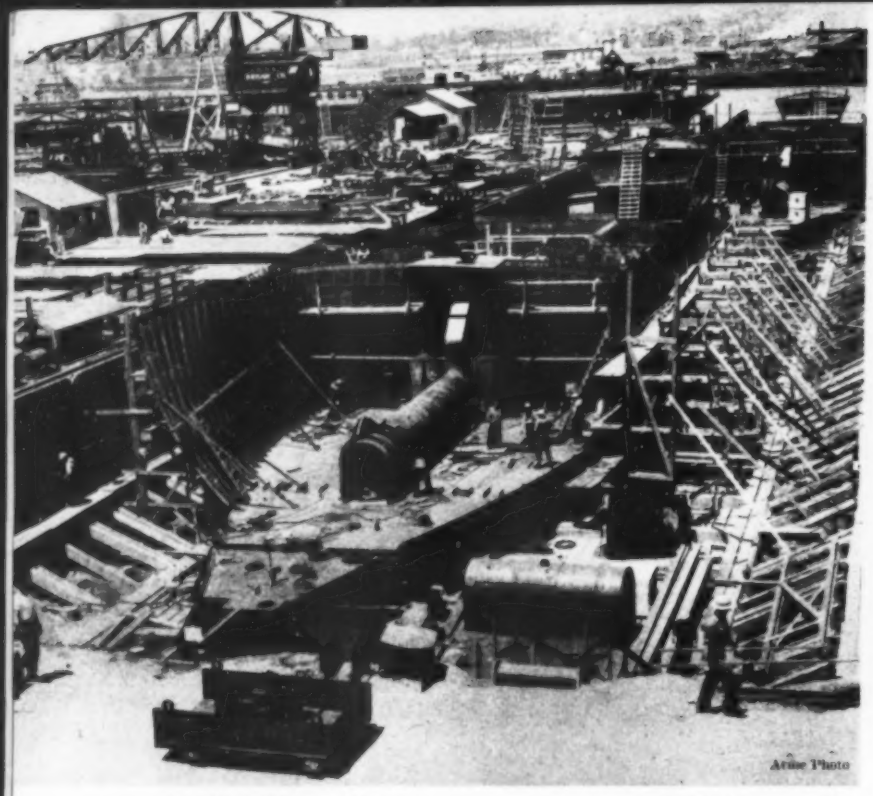
Dim-Out Created by Shielding Street Lights on Seaward Sides

METAL SHIELDS, instead of painting, are installed to mask open type of lights.



EXTENSION LADDER rigged on rear of truck enables worker to paint seaward side of overhead street light globe.

DIM-OUT PRECAUTIONS to eliminate the silhouetting of ships by street lights visible from the sea have involved the use, by the Los Angeles Bureau of Power and Light, of trucks equipped with extension ladders to facilitate the painting of glass globes on their seaward sides and the installation of metal shields on the open type of light, as illustrated in the accompanying photographs. By June 1 of this year 367 lights have been given this protection by line crews of the Bureau, directed by L. G. Gould, superintendent of street light maintenance and T. H. Shepherd, light control consultant. As contrasted with blackout requirements, dim-outs call for the shielding of overhead street lights only on their seaward sides.



Acme Photo

BELOW WATER LEVEL, two steel vessels are assembled in one shipbuilding drydock by Pacific Bridge Co. for simultaneous launching by means of water admitted to dock after hulls have been completed and boats are ready for final outfitting.

GOING TO WORK for U. S. Army Engineers, 25,000th LeTourneau power control unit comes off assembly line amid pleased smiles of Shopmen HAROLD FELDMAN, AL UNRUH and HARLEY MCKAW. Heavy-duty R8 model, painted Army green, is now in service controlling construction equipment on Caterpillar D8 tractor.

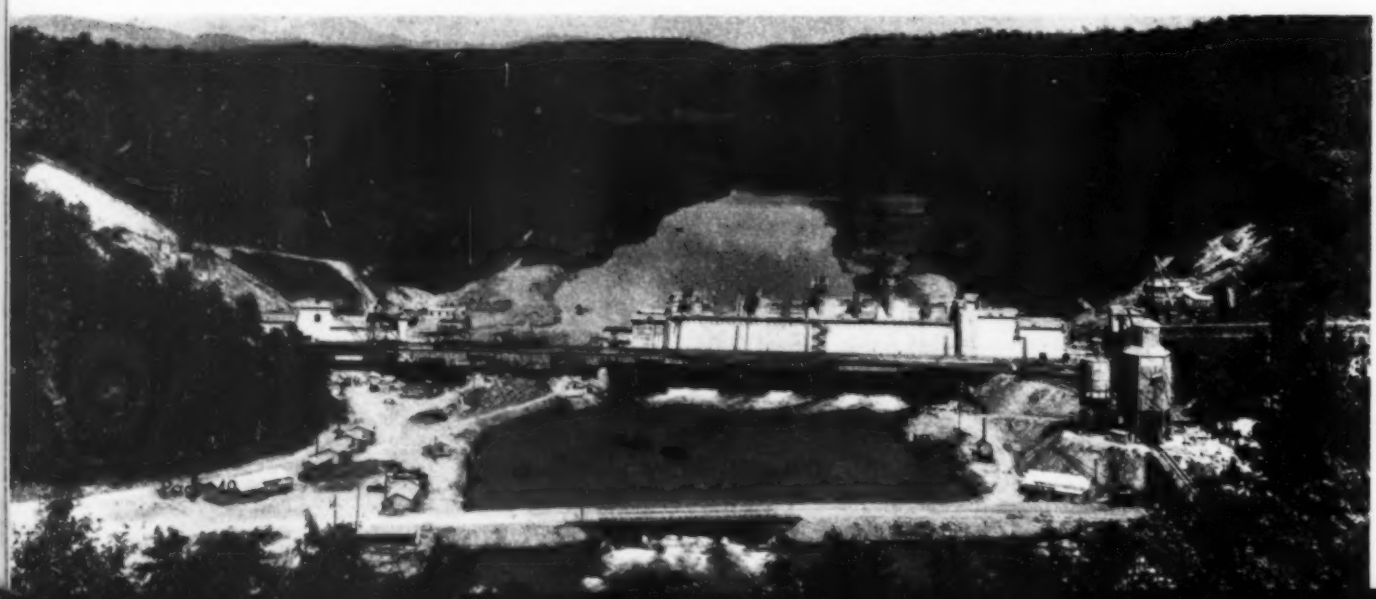
Press Association Photo

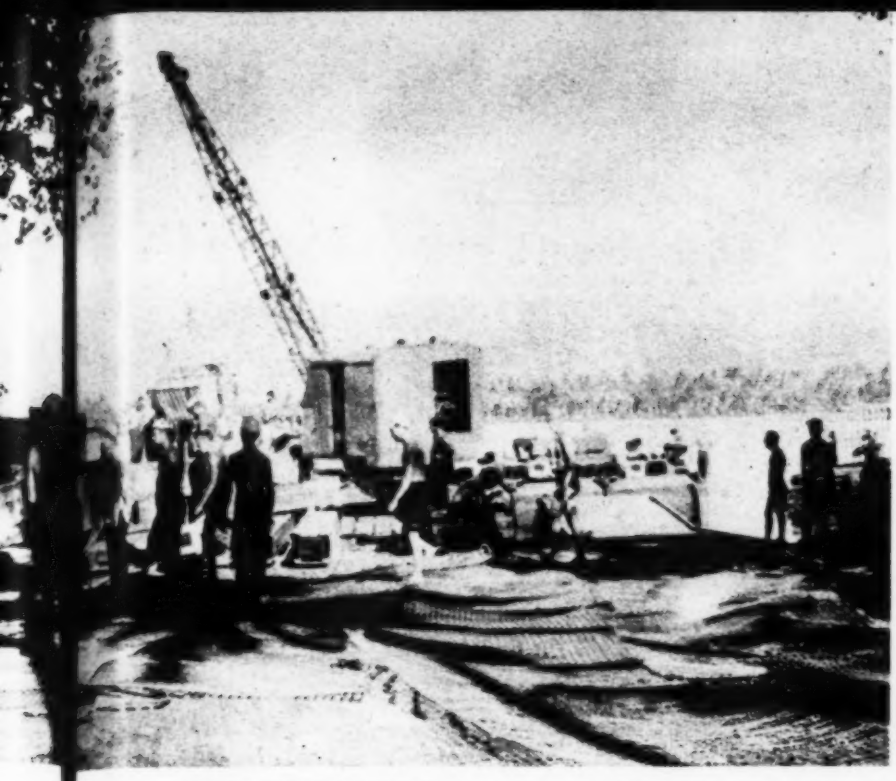
THIS MONTH'S NEWS REEL

Wide World Photo

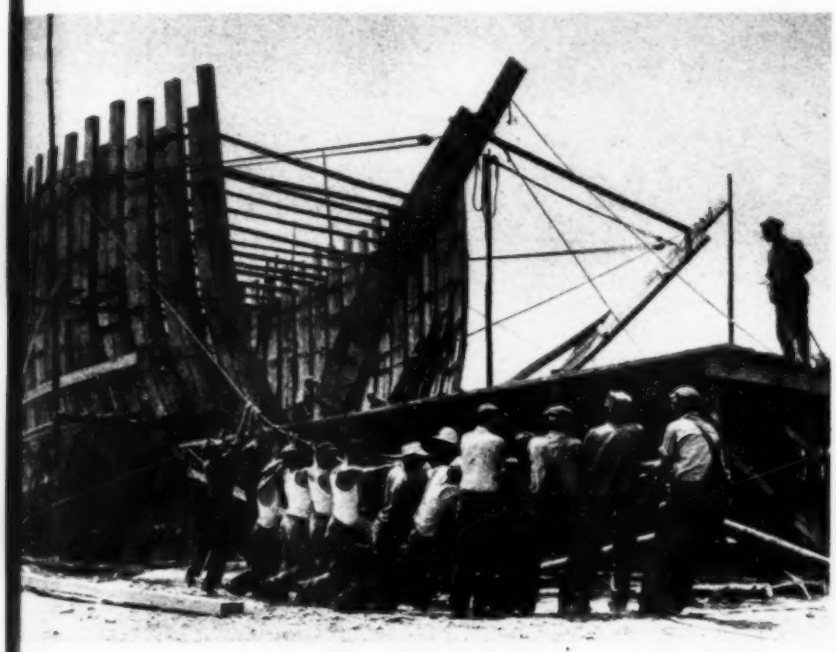
ALASKA HIGHWAY ENGINEER SOLDIERS adopt baby moose found near camp at Charlie Lake and pamper orphan with kindness. Sgt. E. J. SULLIVAN, of Chicago, feeds pet from bottle, while Pfc. JOHN HERMAN, from Long Island, N. Y., holds animal.

APALACHIA DAM (below) under construction by TVA forces on Hiwassee River in western North Carolina is concrete barrier 150 ft. high and 1,250 ft. long which will form 1,100-acre lake with storage capacity of 62,500 acre-ft. backing 10 mi. upstream to Hiwassee Dam. Planned solely for power production, dam will deliver water through 8 mi. of pressure tunnel to 301 ft. of penstocks, developing maximum effective head of about 400 ft. for two Francis turbines driving 37,500-kw electric generators.





SOUTH PACIFIC ISLAND receives barge loads of Army, Navy and Marines' equipment swung ashore by crawler crane to trucks traveling over steel mats spread on yielding surface to carry heavy weights.

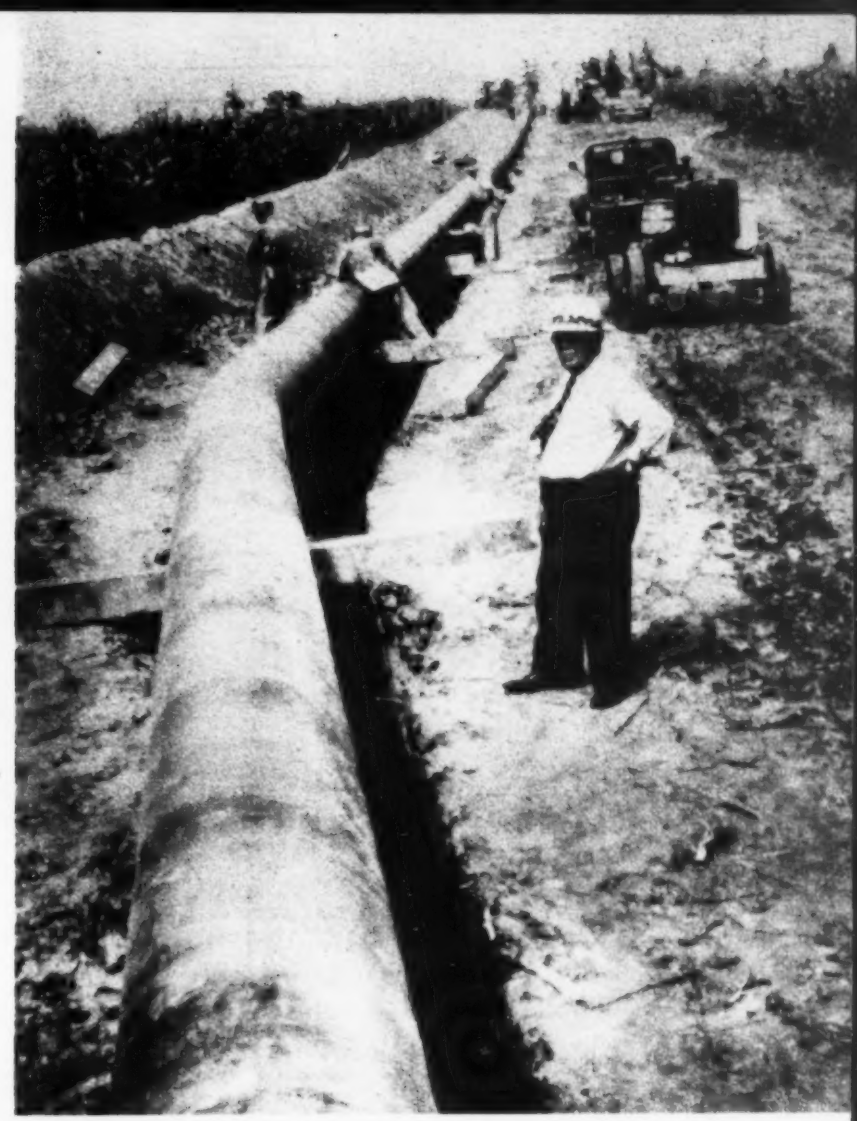


WOODEN BARGES to supplement coastwise cargo ships take shape at New England ways of Camden Shipbuilding & Marine Railway Co., as combined pull of twenty men raises frames set 6 in. apart for hull of craft 180 ft. long with 33-ft. beam, capable of carrying 1,100 to 1,300 tons of coal or other cargo. Frames, constructed on special jigs, weigh 2 to 5 tons each. Planking of 4-in. Oregon fir covers hull. Barges are estimated to cost about $200,000 each.

Wide World Photo

OBSTACLES TO INVASION by airplanes, precast concrete pipe **(below)** in English field bar landings of hostile craft.

Wide World Photo



TO RELIEVE OIL SHORTAGE seven contractors rush construction of 24-in. line 550 mi. long from Longview, Tex., to Norris City, Ill., forming largest completely arc welded crude oil pipe line in world, under direction of BURT E. HULL (in white shirt), vice-president and general manager, War Emergency Pipeline, Inc. Seven firms are: Williams Bros. Corp., O. E. Dempsey Construction Co., Anderson Bros., Oklahoma Contracting Co., C. S. Foreman Co., Ray E. Smith Construction Co. and Sheehan Pipe Line Construction Co. Defense Plant Corp. is financing $35,000,000 project.

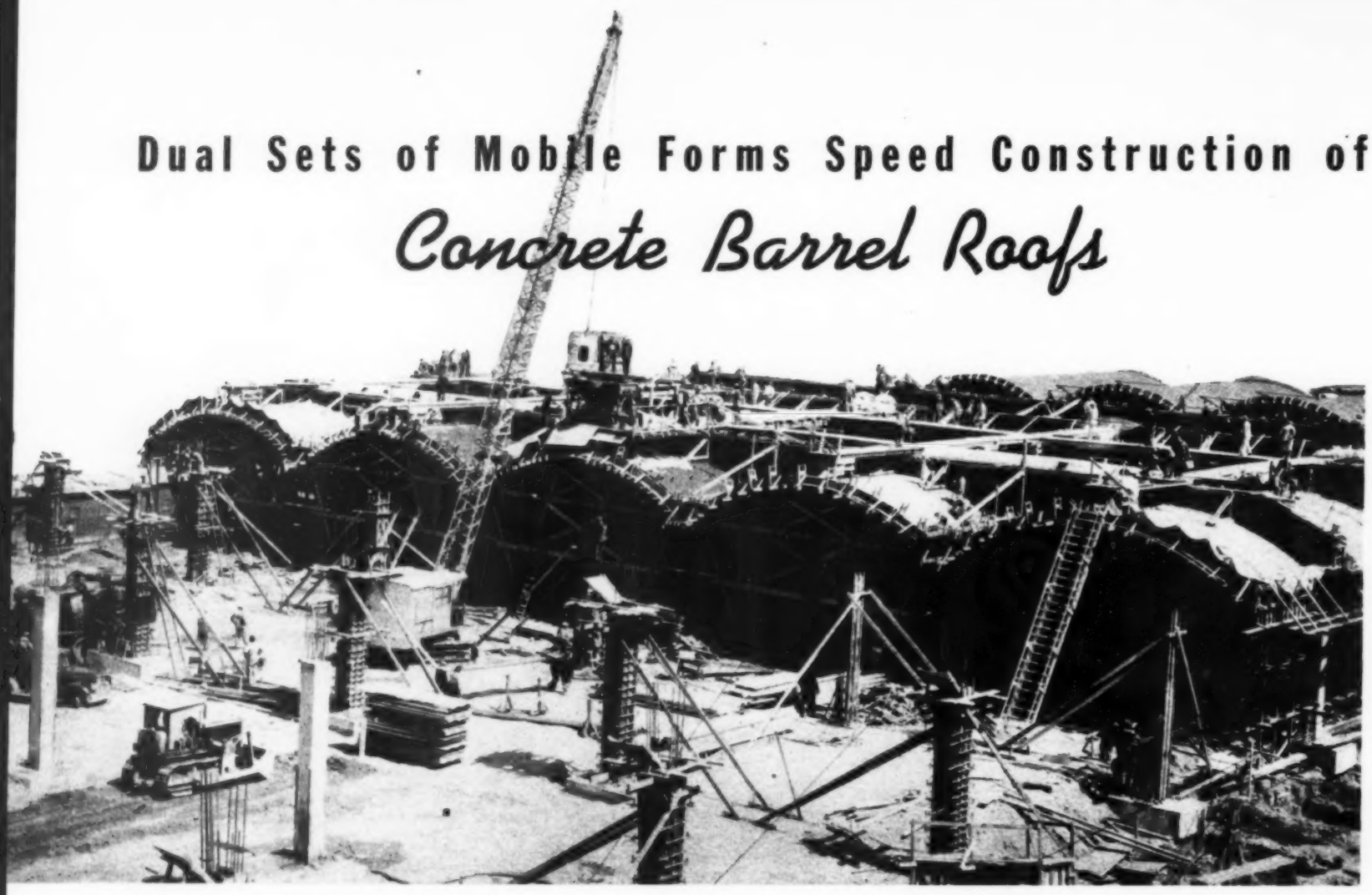
Press Association Photo

MALTA'S BOMBPROOF TUNNELS (below) are excavated in rock of Mediterranean island by British coal miners inducted into Royal Engineers from Wales, Scotland, Yorkshire, Durham, Derbyshire and Cumberland.

British Combine Photo

Dual Sets of Mobile Forms Speed Construction of

Concrete Barrel Roofs



USING SYSTEM OF ROOF RUNWAYS, crews distribute high-early-strength concrete to barrel arches and stiffening frame of roof unit. Manitowoc crane raises buckets of truck-mixed concrete to roof hopper. Concrete placement starts at two edges of roof and proceeds on successive barrels to center of structure.

3d layer s'f't. No.13-S2 Frame: S't, form & prep. No.12-S4	3d layer s'f't. No.14-S1 Frame: S't, form & prep. No.13-S2	3d layer s'f't. No.13-S3 Frame: S't, form & prep. No.14-S4
24	**25**	**26**
Concrete No.13-S1	Concrete No.14-S3	Concrete No.12-S6
Cure No.12-S3	Cure No.13-S1	Cure No.14-S3
Move & reset No.14-S4 to S6	Move & reset No.12-S3 to S5	Move & reset No.13-S1 to S3
1st & 2nd layer s't'f. No.13-S4	1st & 2nd layer s't'f. No.14-S6	1st & 2nd layer s't'f. No.12-S5
3d layer s't'f. No.12-S6	3d layer s't'f. No.13-S4	3d layer s't'f. No.14-S6
Frame: S't'f, form & prep. No.14-S3	Frame: S't'f, form & prep. No.12-S6	Frame: S't'f, form & prep. No.13-S4

CALENDAR OF SCHEDULED OPERATIONS for barrel-roof construction on three buildings definitely fixes required progress for various crews on each date. Putting scheduled operations in calendar form has good effect in spurring superintendents and foremen to keep up to planned progress.

IN PLANNING CONSTRUCTION of a group of large concrete-frame storage buildings at a Navy supply depot, multiple-barrel, thin-shell concrete roofs covering the structures stood out as the critical factor which would control the rate of progress. To speed this critical phase of the operations the contractors on the project put double sets of traveling barrel-roof forms in each of three buildings erected simultaneously during the first stage of the program. Use of six complete sets of mobile forms in the three buildings enabled the constructors to make roof pours on five working days each week. Because conditions on the job required that the two forms in a building start at the same end and build alternate roof units, operation of the double sets of forms involved some complications, but the increase in progress far outweighed the disadvantages.

After completing the roofs on the first three storage buildings, the forms served in construction of a number of additional warehouses of the same type. Large though these buildings are, they represent only a fraction of the total

REINFORCED-CONCRETE COLUMNS (below) are completed for section of building before barrel roof forms are moved ahead. Single set of traveling forms is in use on this building, one of last to be constructed.

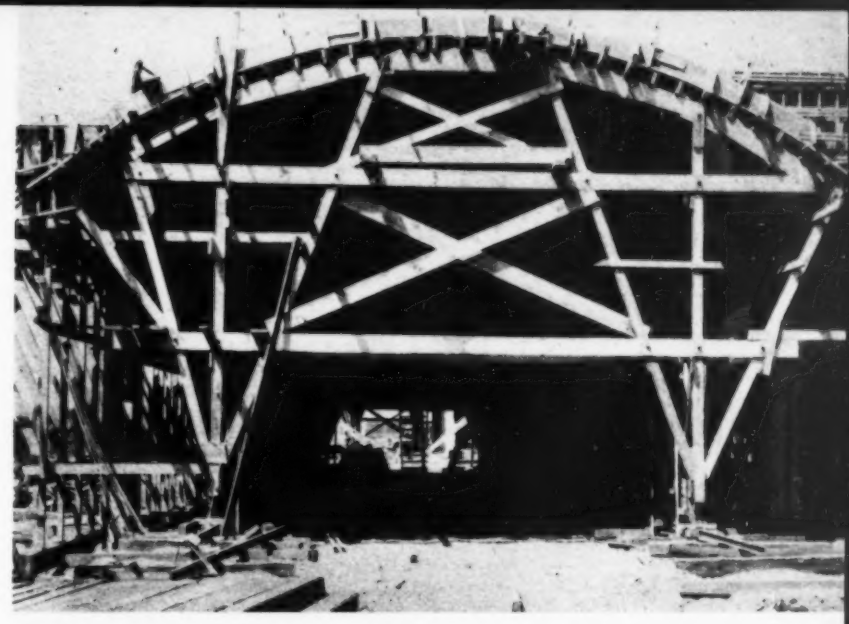
BARREL-ROOF FORMS (below) are moved ahead individually on steel rails in bays between columns.

work under the contract. In the overall schedule for the job, construction of the warehouses had to be coordinated with a multitude of other operations going on at the same time.

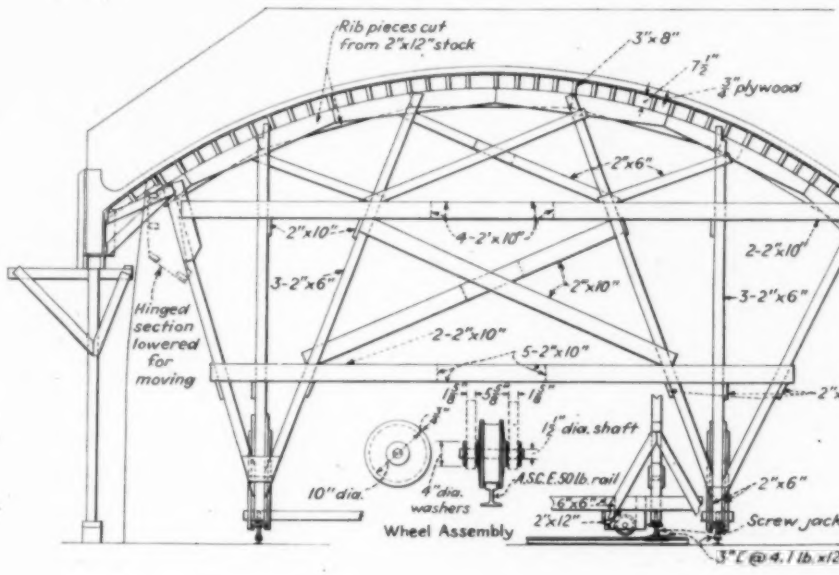
Features of Roof — Monolithic roof units covering the width of the buildings comprise five thin-shell barrels. The barrels are rigidly connected to one another and to a stiffening frame which transmits the roof loads to supporting columns. Designed in accordance with the Z-D system by the Roberts & Schaefer Co., consulting engineers, Chicago, the barrels are curved to the proper radius to eliminate bending moments and to transfer all stresses by direct paths to the stiffening frame. Reinforcing steel is installed to resist tension stresses. With this design, the concrete shell need be only thick enough to resist buckling. The thickness of the barrel shell on the storage buildings is 3¾ in., sufficient to provide minimum cover of at least 1 in. over the reinforcing steel.

Eight monolithic roof units cover the length of a building. The stiffening frame for each roof unit consists of two transverse beams, supported over the columns, and two edge members at the sides of the building. Beyond the transverse beams of each unit, the multiple-barrel roof slab projects as a cantilever to a ½-in. expansion joint separating adjacent roof units.

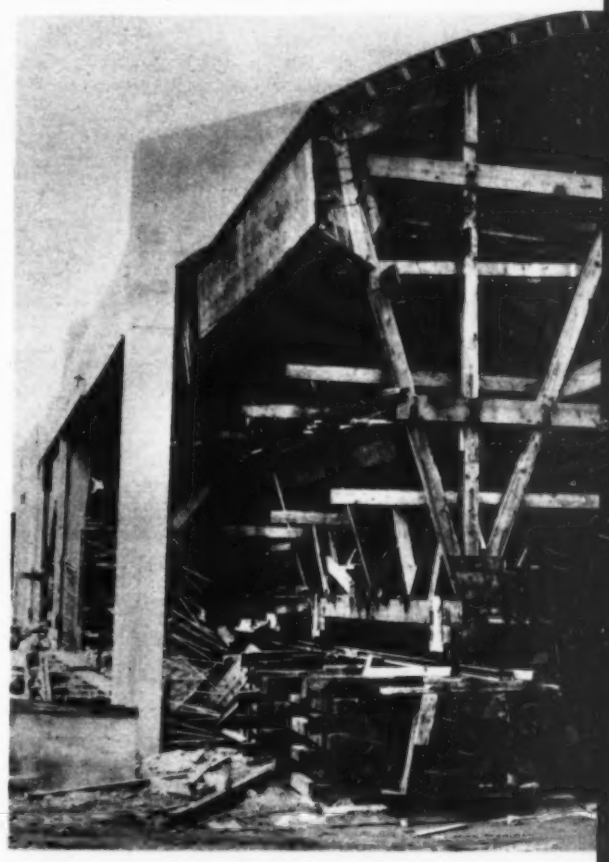
End units are three-fourths as long as intermediate units. An interior unit includes two cantilevers, while an end unit has only one. Free edges of the cantilever slabs are reinforced with small stiffening ribs. Transverse beams of the stiffening



FRAMED TIMBER TRUSSES with top chords curved to shape of roof barrel carry purlins supporting form for thin-shell concrete roof.



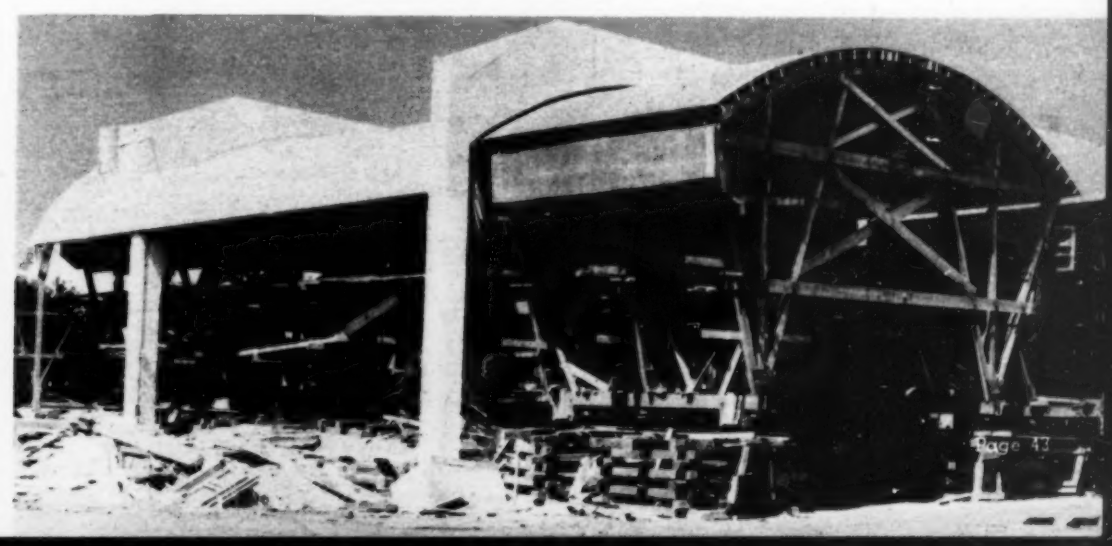
TRAVELING BARREL ARCH FORM for roof unit comprises eleven trusses of this type, so arranged as to put two trusses under each of two transverse beams, with remaining trusses uniformly spaced under center span and two cantilevers. Screw jacks and double-flanged wheels are mounted under posts of all trusses.

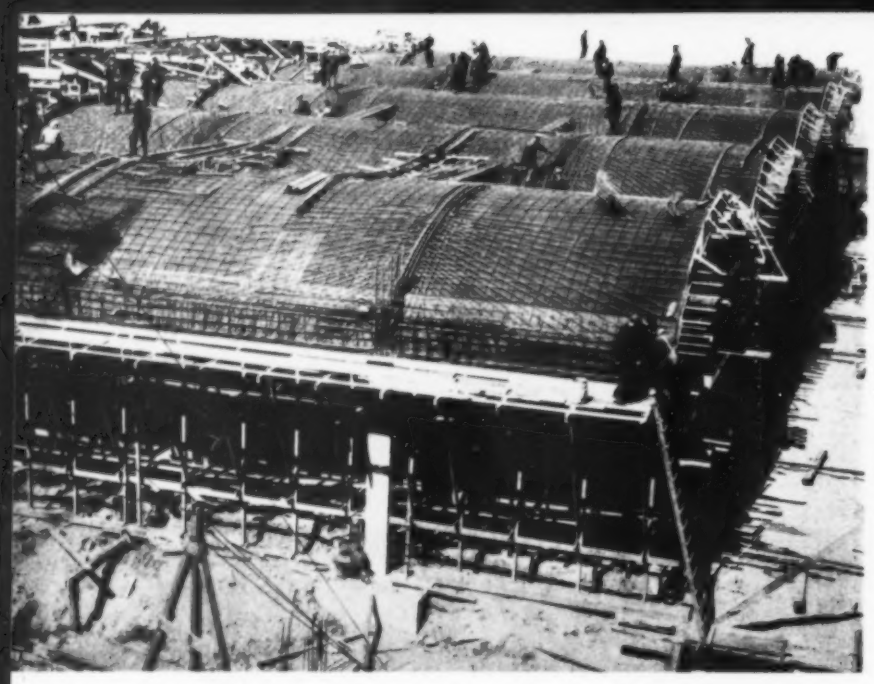


TO CLEAR FLARED INNER FACE OF EXTERIOR COLUMN, as shown by second column in line, barrel form for adjacent bay is made with hinged edge which can be dropped.

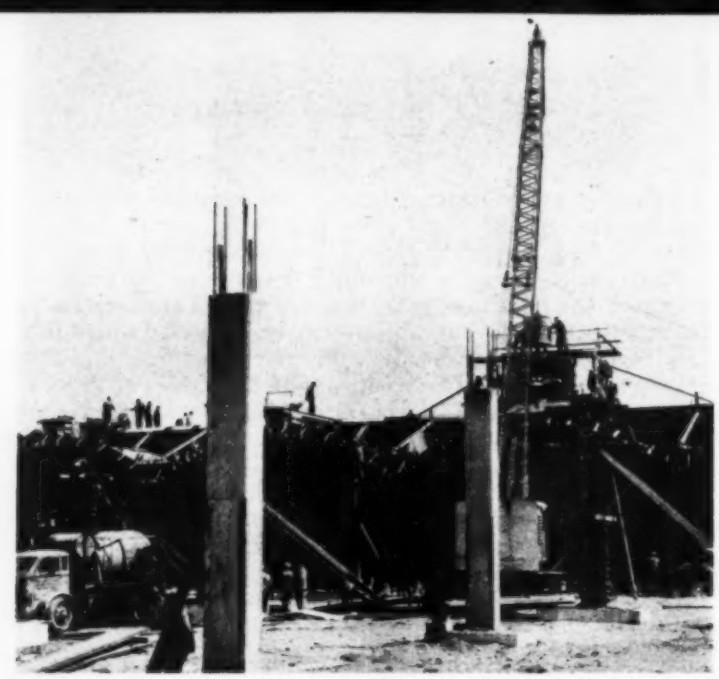
SCREW JACK (below) for raising and lowering barrel form during pouring operations is permanently attached to base of each truss leg. Double-flanged steel wheels are mounted between timber plates adjacent to truss leg.

CONSTRUCTING END UNIT of concrete barrel, form traveler projects beyond buildings.





DIAGONAL RODS installed in stress paths in thin-shell barrel roof transmit tension stresses to stiffening girders.



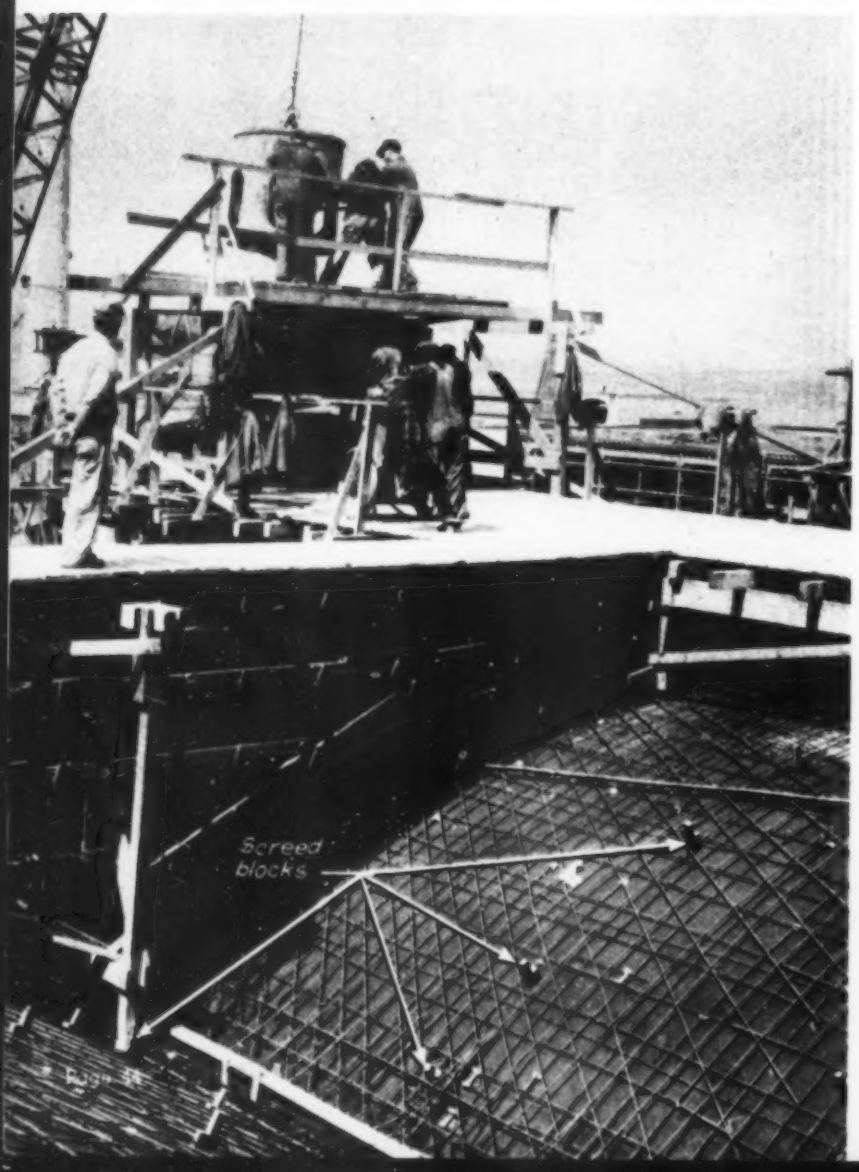
ROOF CONCRETE mixed and delivered by truck mixer is hoisted by crane to hopper on roof runway.

frame project above the top side of the roof only; they do not extend below the smooth ceiling of the barrel arches underneath. These beams have a depth of about 30 in. over the barrel crowns and of nearly 10 ft. over the valleys between the barrels.

Mobile Forms—Double sets of traveling barrel-roof forms had been applied on other jobs to buildings more than twice the length of those at the Navy depot, but these forms had operated on separate parts of the building, one starting at the end and the other at the center, with both forms moving in the same direction. On the Navy buildings a different system had to be followed to rush roof concreting immediately in back of column construction. By this system the two sets of forms started at the same end of a building, and the forward set moved ahead to pour alternate even-numbered units, such as the second and the fourth, while the second set of forms advanced through completed roof units to close the gaps left by the first form.

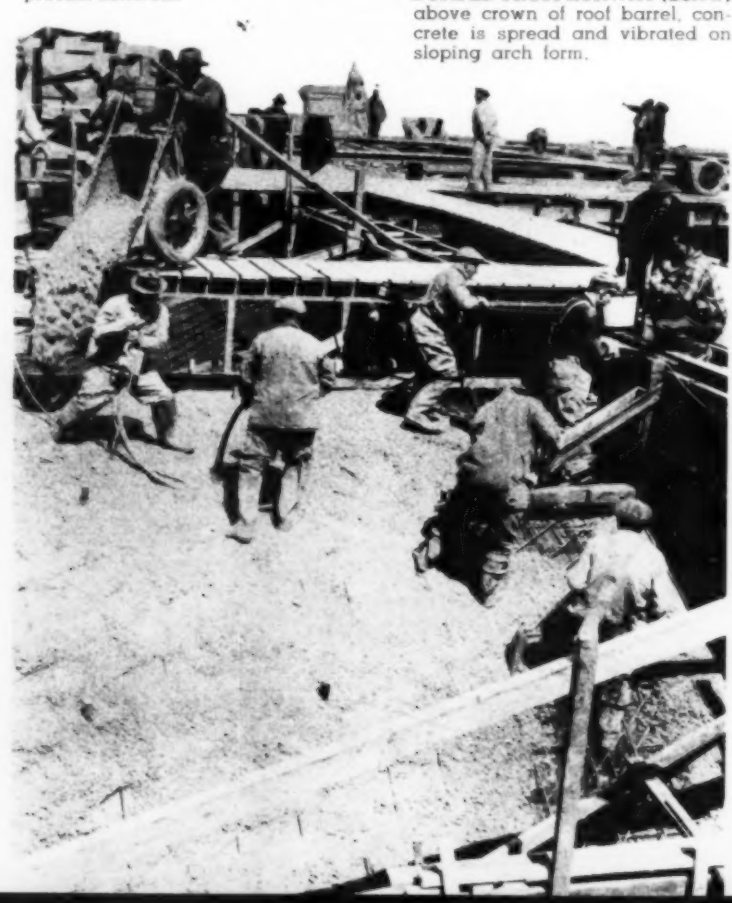
Form Design — Each set of roof forms included five separate arch travelers for the thin-shell barrels. The travelers, mounted on double-flanged wheels which rolled on two lines of steel rails, were moved ahead individually by a bulldozer pushing against the lower cross-tie. Each traveler was made up of eleven wood trusses braced longitudinally to form a rigid unit.

Accompanying photographs indicate the features of the form traveler. Duff-Norton screw jacks were attached permanently to the bases of the truss legs adjacent to the wheels. These jacks raised the form to position for a pour and lowered it after the concrete had attained sufficient strength to permit striking the form. Top chords of the arch trusses were shaped to the curvature of the roof barrel. The form surface against which concrete was placed consisted of



CONCRETE CARTS (left) travel over wooden runways supported by trestle bents in valleys. Note how trestle legs and reinforcing steel are set on screed blocks of precast concrete.

DUMPED FROM RUNWAY (below) above crown of roof barrel, concrete is spread and vibrated on sloping arch form.



BEAM FORM for transverse member of stiffening frame is filled by depositing successive layers of concrete which are vibrated internally with electric-motor-driven flexible-tube vibrators.

FINISHERS FLOAT SURFACE of thin-shell slab placed on roof barrel without top forms.

⅝-in. plyform-grade plywood nailed to longitudinal purlins which were attached to the top chords of the trusses. Before each pour, the plywood surface was given a brushed application of form oil. Details of the arch truss are shown in an accompanying sketch.

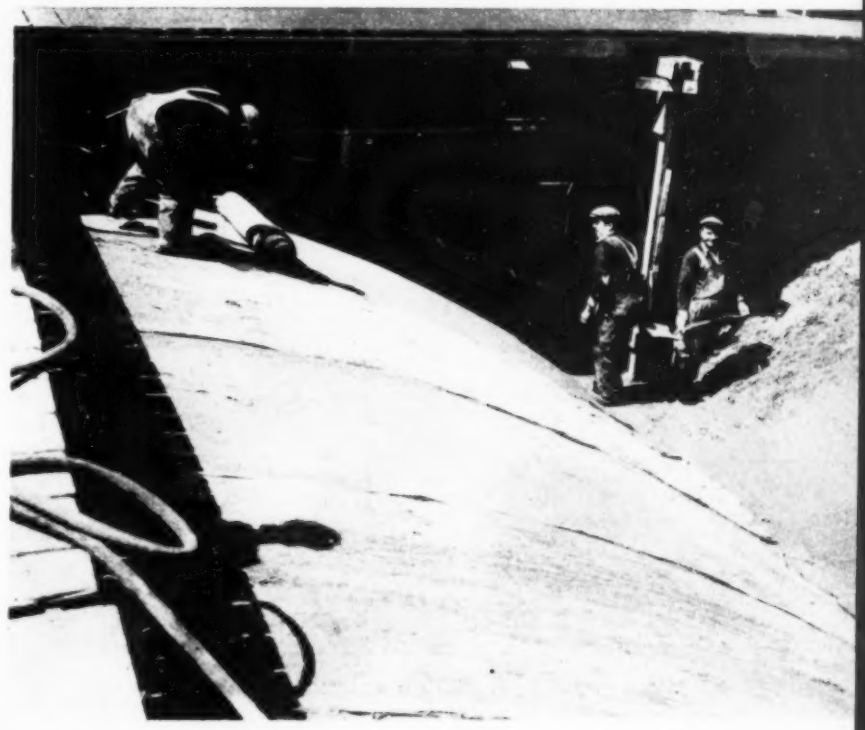
Soffit forms for the valleys between the barrels were set and shored separately. Interior supporting columns under the roof have flat vertical faces which presented no problem in moving the forms. Exterior columns, however, have flared inside faces. To clear the flare, the barrel forms in the adjacent aisles were hinged near the outer edge. The form for the lower half of the edge member was permanently attached to this hinged edge. Edge members, which are 1 ft. wide and 4 ft. 4 in. deep, extend 2 ft. below the springing line of the barrel.

Form Cycle—Use of high-early-strength concrete in the roof units permitted forms to be struck on the second day after a pour in warm weather and on the third day in cold weather. The operations of striking, moving and adjusting the forms were accomplished in one day. Two and one-half shifts were required for setting reinforcing steel, and another shift was needed for erecting runways. By employing second shifts or overtime, if necessary, each set of forms was held to a schedule which called for a pour one every seventh working day.

Roof Concrete — High-early-strength concrete for the roof was made to a proper consistency for placing on the barrel slopes without use of top forms. A slump of 3 to 4 in. proved about right for this purpose. All the concrete, both in the shell and in the stiffening frame, was vibrated internally with Viber electric flexible-tube vibrators, about six of which were kept in operation during a pour.

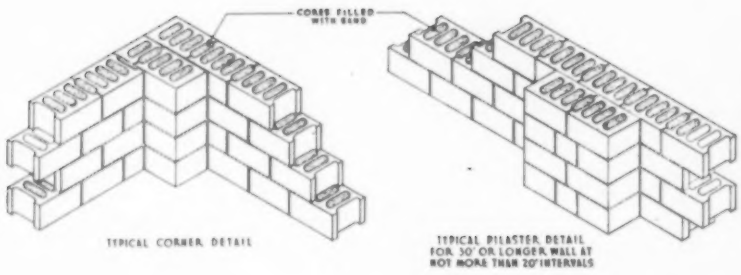
Several variations were made in cement content until the mix became standardized at 1.43 bbl. per cu.yd. Both gravel

(Continued on page 122)



COTTON BLANKETS kept wet with hose for two days protect thin-shell roof while concrete is curing.

EXTERIOR WALLS (below) of barrel-roof warehouses are inclosed by brick curtains on top of concrete grade beams.


CORES FILLED WITH SAND
TYPICAL CORNER DETAIL
TYPICAL PILASTER DETAIL FOR 30' OR LONGER WALL AT NOT MORE THAN 20' INTERVALS

SUGGESTED DETAILS for sand-filled 12-in. hollow concrete masonry unit walls for protection against sabotage.

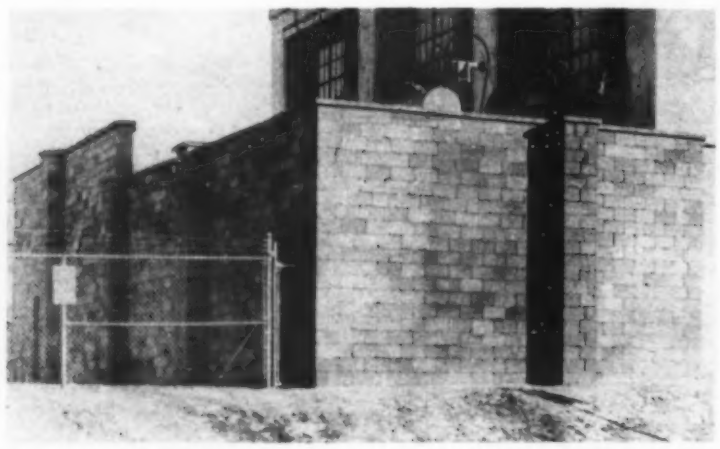
Sabotage Protection

Given by Walls of Concrete Masonry Units

AT THE OUTBREAK OF WAR sand bags were extensively used in England as protection against bomb splinters. They were found, however, to be inadequate as continuing protection; the bags rotted out within a few months, and many walls collapsed. Then, too, both sacks and sacking were urgently needed for direct war use. For these reasons — inadequacy and more vital need for critical materials — the British Home Office now recommends hollow concrete masonry units for protective walls.

Since the United States declared war, increased use has

(Continued on page 110)



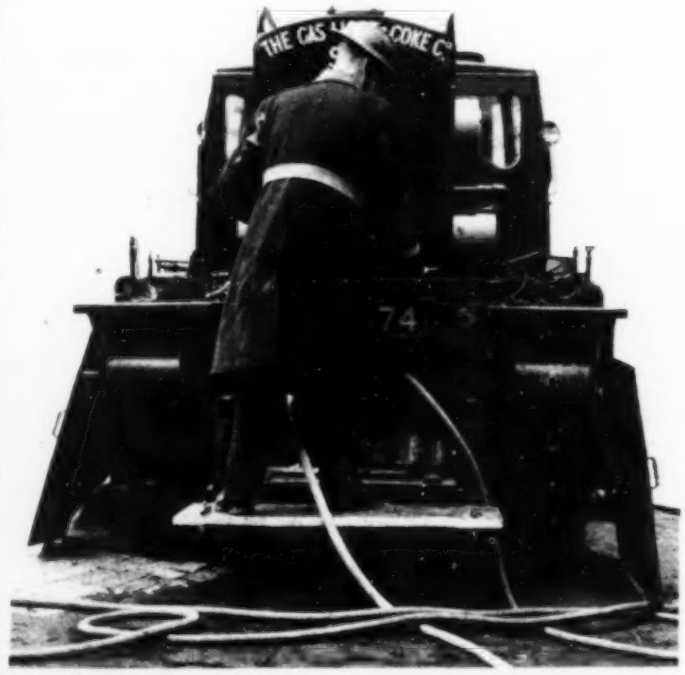
PROTECTION FOR TRANSFORMERS at power station in Kansas City, Mo., is afforded by 12-in. hollow concrete masonry wall 13 ft. 8 in. high.

BULLET-RESISTING TEST of concrete masonry wall is made by rifle fire at close range.

HOW LONDON REPAIR

"BAGGING OFF" broken main to stop flow of gas is done by inserting through hole in top of pipe rubber bag and then inflating it with compressed air to form plug in line. Worker is shoving deflated bag into main. In foreground is shown one of bags inflated.

British Official Photos



EMERGENCY REPAIR TRUCK of London's Gas, Light & Coke Co., equipped for repair of gas mains broken by enemy bombing.

Bombed Gas Mains

By R. N. LEFEVRE
Engineer, Gas Light & Coke Co.,
London, England

The author of this article, R. N. LeFevre, before the war, was officer in charge of technical training of the outdoor staff of London's Gas, Light & Coke Co. He organized the Air Raid Precautions instruction of the men who have since carried out the repair work of the gas supply of London. During the period of heavy raiding by German bombing planes Mr. LeFevre was attached to the gas company's central division in London as engineer directing repair crews. He was out in the streets of London during most of the raids and thus writes from first-hand practical experience. — EDITOR

AFTER BOMBING RAID has shattered pavement and gas mains beneath it, crew of gas company start work on repairing damage. Equipment includes portable compressors serving paving breakers and other pneumatic tools.

AN EFFICIENT PUBLIC UTILITY CIVIL DEFENSE ORGANIZATION consists of two parts: the inside or control staff and the outdoor or operational staff. Both must work closely together and have a clear picture of what is happening both during and immediately following enemy action.

Control rooms and methods of obtaining reports are organized with this in view. Take, for instance, our control room during an air raid on London. We quickly found that we could have too much information coming in at once; too many telephones ringing; too many people overlapping in their duties; all due, of course, to the fact that the enemy was dropping too many bombs! That, of course, was quickly rectified. Reports were cut to a minimum, although still retaining all their importance. Strange though it may seem, it is quite easy to lose a bomb if you are not careful to give it an index number and keep a careful check on it.

In London, the Gas Company's area is divided into divisions, each with a central control room which is permanently manned. When a bomb drops, the air-raid warden of the sector reports all details to his local control center, maintained by the local municipal authority. From here the information is passed on to the services concerned. Each divisional gas control room may cover the area of several municipal authorities and is thus in contact with several control centers by a telephone with a secret number, which insures that the gas control is confined to its essential business and not bothered with calls direct from the public.

Advice to Wardens

Air-raid wardens have been taught to recognize and describe correctly:

(1) MAINS running along the street.

(2) SERVICE PIPES running across the street from the mains to the premises

(3) CARCASS PIPES inside premises.

This is because the repair organization is in two parts: heavy gangs with trucks, compressors, drills, and other road-breaking tools for dealing with mains; and light reconnaissance parties in trucks or autos capable of shutting off valves and dealing with service pipes and other small work. Originally there was a tendency for wardens to call gas pipes "mains", and a good deal of valuable time was wasted and resources depleted by sending out heavy gangs to relatively unimportant incidents which could have been dealt with easily by the lighter parties of two or three men.

Wardens are further encouraged to distinguish between priority incidents requiring the immediate attendance of

(Continued on page 117)

MEMBER OF GAS REPAIR PARTY (left) wears hard hat and carries gas mask. While asbestos suit is carried on each emergency repair truck, Mr. LeFevre reports that there has never been an occasion where use of such apparel was necessary.
REPAIR CREW (right) of gas company gets into action where bomb has broken gas mains and other subsurface utilities in London street.

LOUIS KIRK (left) field foreman, looks over blueprint with EDWARD MANNING, general foreman for Robert McCarthy Co.

With Prefabricated Panels Contractor Robert McCarthy Builds for Shipyard Workers

Forty Houses a Day

WHEN ROBERT McCARTHY, San Francisco contractor, received a "letter of intention" from the Federal Public Housing Authority on his low bid of $2,000,000 for 1,000 of the 4,000 homes needed at Vallejo, Calif. for civilian workers at Mare Island Navy yard, he did not wait for further encouragement to start work. By the time he received the "order to proceed", which came on May 25, he had built a lumber prefabricating mill near the site and with it had completed enough floor, wall and roof panels for the entire job.

As these panels are units with which the entire house was to be built, excepting only the foundation timbers, when field construction actually started, the rows of houses grew almost like mushrooms. In the month of June the McCarthy organization erected the entire quota of 1,000 houses, progressing some of the time at the rate of 40 houses per day. This was with a crew of about 400 men; at the peak, mostly working one 9-hr. shift, 6 days a week. Thus, with the advantage of his early start, McCarthy completed his contract in less than one-third the allotted time, which began with arrival of the "order to proceed."

EQUIPMENT AND MATERIALS

Major items of material used on this project included:

Douglas Fir plywood .....14,000,000 ft. b.m.
I. F. Laucks self-bonding glue .....200 bbl.
Johns-Manville rock wool batts ....26 carloads
Redwood lumber for substructure 1,000,000 ft. b.m.

Some of the equipment items were:

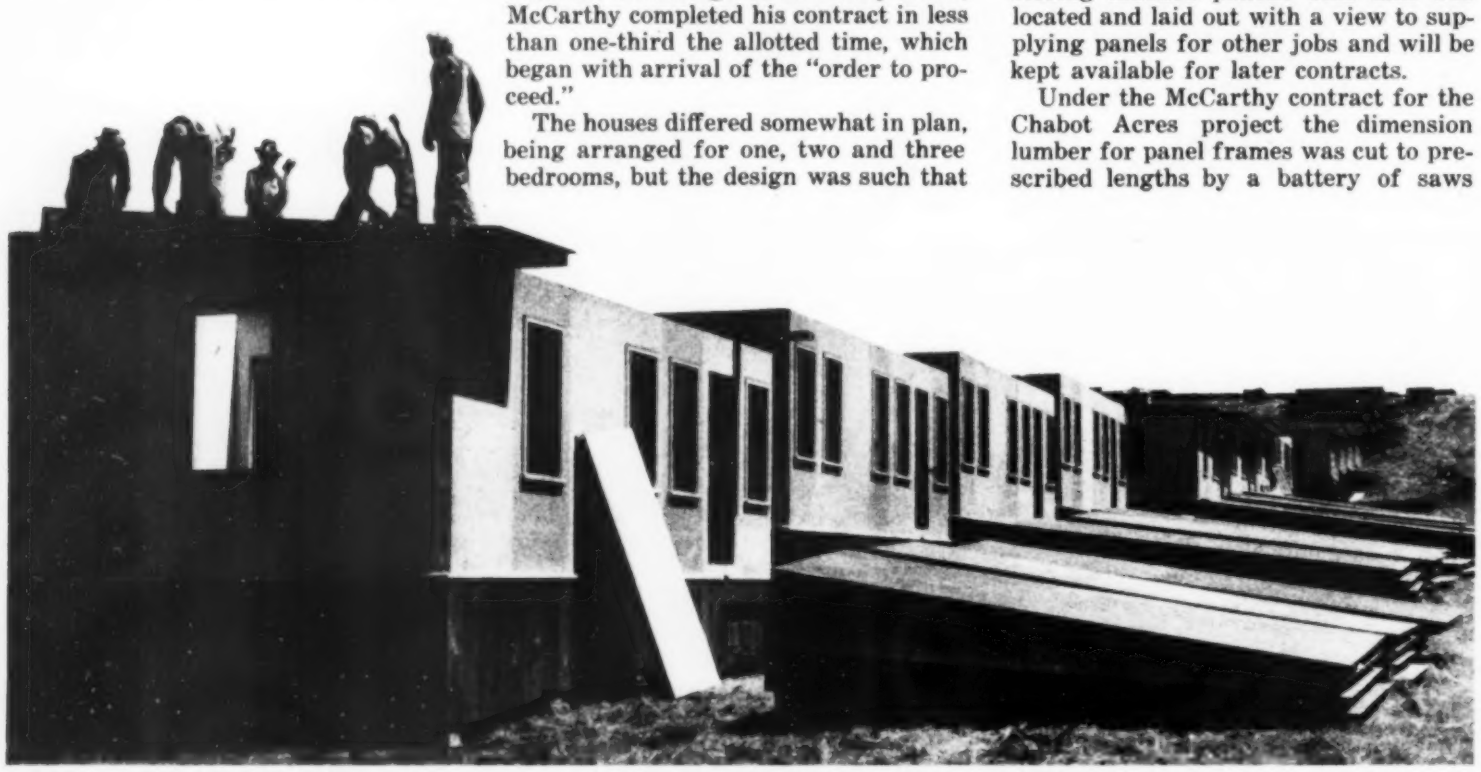
10 DeWalt electric saws (3 hp.)
10 Comet electric saws (3 hp.)
30 Laucks glue guns
50 Bostitch stapling hammers
25 Skilsaws (air and electric)

The houses differed somewhat in plan, being arranged for one, two and three bedrooms, but the design was such that the several types could all be built with the standard prefabricated panels. This had the two-fold advantage that the entire project could be built from a minimum number of prefabricated parts and the structures can be taken down later. The specifications called for "demountable" houses and the panels were both glued and nailed to make them strong and rigid. They are expected to be readily adapted to new uses when the need for housing in this location is past and the structures are dismantled for moving.

Prefabrication Plant

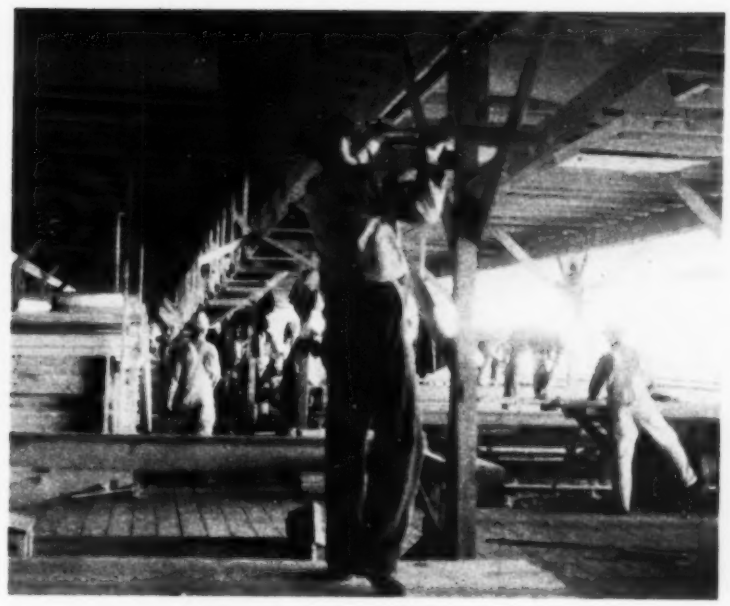
The prefabrication plant is 148 ft. wide by 967 ft. long. On one side are railroad tracks where lumber and other materials are delivered and stored; on the opposite side a field affords space for storing finished panels. This mill was located and laid out with a view to supplying panels for other jobs and will be kept available for later contracts.

Under the McCarthy contract for the Chabot Acres project the dimension lumber for panel frames was cut to prescribed lengths by a battery of saws

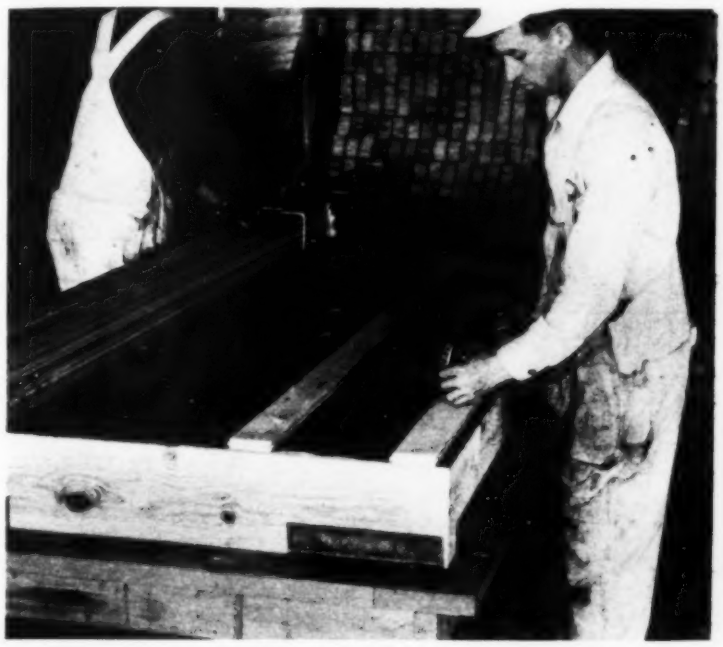


AT SITE. panels are kept on hand in advance of assembly needs. Note 2-ft. projection of roof panel forming eaves.

TONGUE-AND-GROOVE FLOORING is cut by 16-in. DeWalt saw near upper end of gravity conveyor.



OVERHEAD GRAVITY ROLLER CONVEYOR running lengthwise of mill between assembly line and stock piles replenishes materials used.



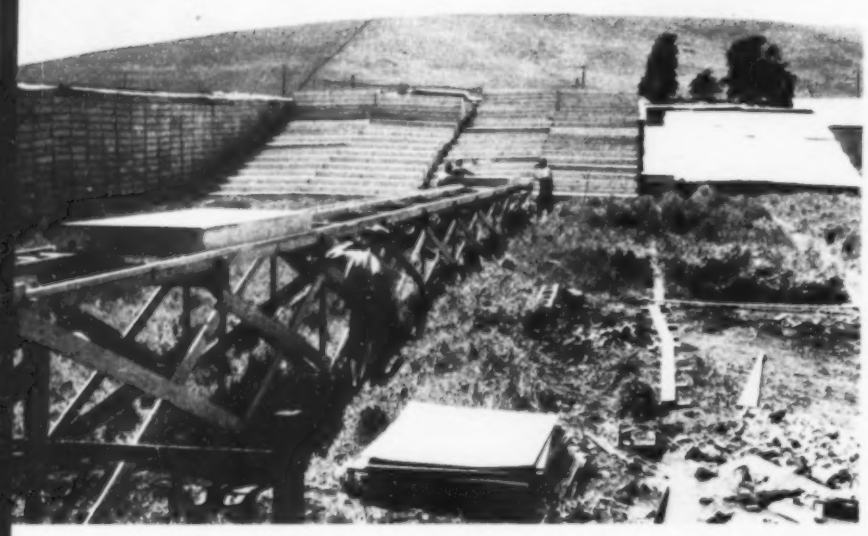
ON 4x12-FT. FLOOR PANELS tar paper is put on cross header first and then T&G flooring is nailed on, leaving space along edge so that when panels go together one piece of flooring just fills gap.

JIGS at convenient working height hold panels true and square during assembly in mill.

near one end of the plant. Then the precut pieces traveled by gravity roll conveyor to stock piles all along the production lines. Jigs on benches of panel size, some 40 or 50 of them, were arranged in a long row, each with stock piles conveniently at hand. Carpenter crews of three to six men, according to the type of work done, took the precut parts from the stock piles, assembled them and fastened them together with glue and nails on the benches. Finished panels were steadily moving out on roller conveyors to the stockpiles alongside the mill.

Floor panels were the easiest to construct because they consisted of a simple 2x8-ft.-frame on which T&G flooring was nailed. In wall and roof panels, plywood was glued to the frames (as well as being nailed) and a considerable

COMPLETED FLOOR SECTIONS are moved along roller conveyor by hand toward gravity conveyor delivering to stock piles.

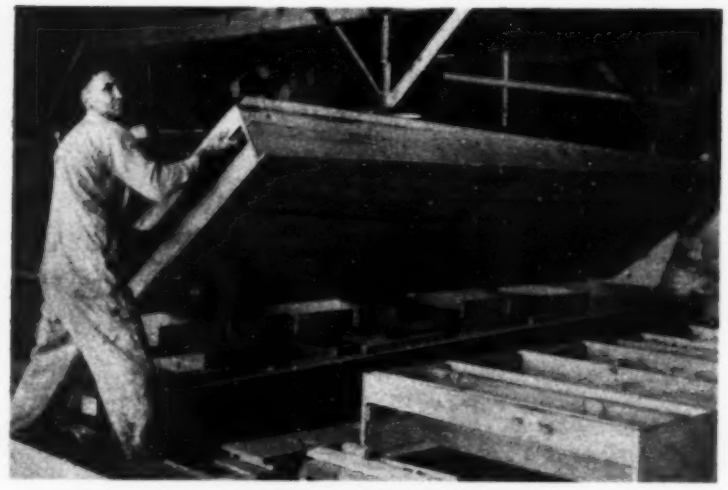


ON GRAVITY CONVEYOR floor sections roll out steadily to stock piles, awaiting shipment to site.

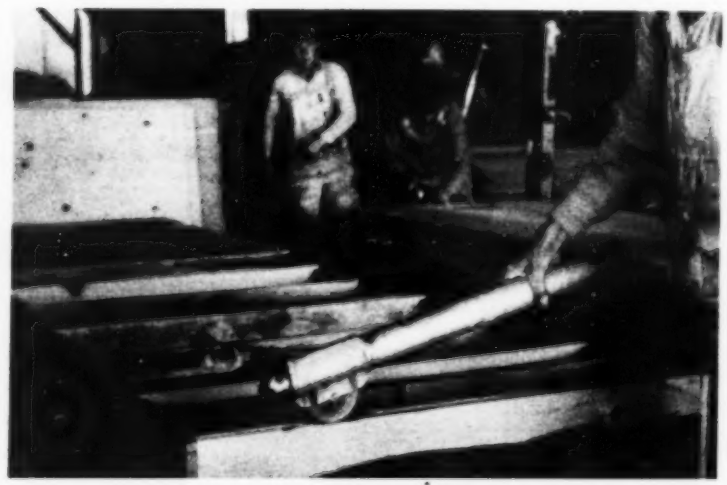
FOR INSULATION OF CEILING PANELS, Johns-Manville rock-wool batts are laid in between cross headers of ceiling panel and fastened there by being nailed in place with Bostitch stapling hammers.

MOTOR-DRIVEN ROUTING TOOL is used with guide template to cut small openings for convenience outlets in panels. Wiring goes in panels before plywood is put on.

LARGER OPENINGS (below) are cut in plywood, sawing five thicknesses at time while plywood is held in place by clamps.



CEILING PANELS are 14 ft. long, two 4x7-ft. plywood sheets being put on while panel is upside down. With plywood in place, panel is turned over and again rested on same jig.



GLUE IS APPLIED in panel assembly by Laucks glue gun which spreads adhesive on frame and cross headers before plywood is put on.

SELF-BONDING GLUE, of which some 200 barrels were used, is mixed by motor-driven paddles in 5-gal. cans.

amount of special work was involved. Certain panels left the mill with electrical outlets built in, wedge-shaped roof panels were insulated with batts of Johns-Manville rock wool and provision for cabinets, windows and other facilities made other "specials".

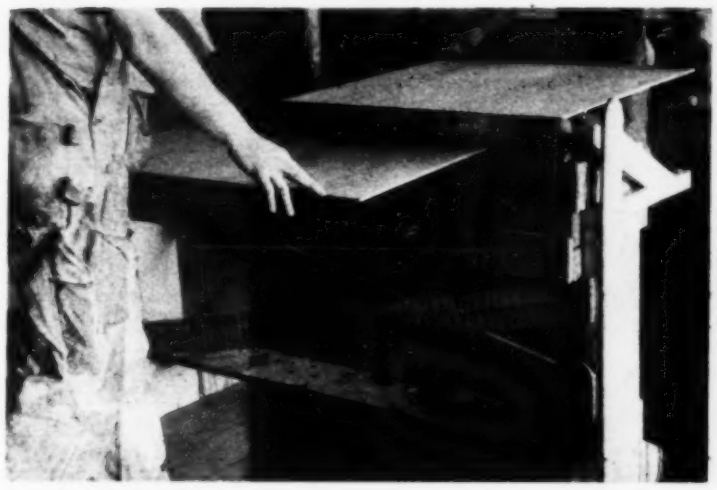
No plywood pieces, cut away in trimming and fitting around openings and specials, were wasted. All scrap more than 2 in. wide was gathered up for a stock pile from which cabinets, shelves and other finishings were made. For shelves, the plywood pieces were glued together into ¾-in. thicknesses, which were found to be stronger than solid wood.

The Douglas Fir plywood panels 4x8 ft. in size constituted the largest single item in the makeup of panels. On the inside a ¼-in. thickness was used and on the outside a ⅜-in. weatherproofed sheet. Plywood went to the panel assembly jigs without need for precutting. In the ceiling panels, where a 14-ft. length was needed for overhang at the eaves, the plywood was put on in two pieces each 7 ft. long.

The site for this housing project is

(Continued on page 112)

Forty Houses a Day . . . Continued



JOB-MADE ROLLER applies glue to small pieces of plywood that otherwise would be wasted. These pieces are glued together to make shelving, ¾ in. thick and to meet other finish requirements.

McCARTHY VICTORY BATHTUBS at rate of 40 a day, are built in this last-minute addition to plant layout. With tiles put on first against form, concrete bathtubs were cast upside down and later turned over for finishing tile joints with white waterpproof (Golco) grout.

30-IN. EARTH AUGER, driven by Buda engine, makes 425 holes per day (16 hr.) for concrete foundation piers.

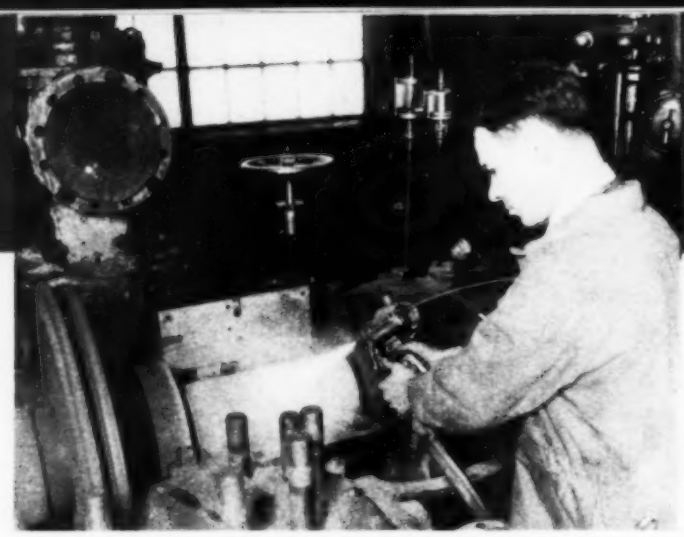
FLOOR PANELS are bolted to 3x10-in. timber frame with ½-in. steel bolts countersunk in wood.

HOUSES OF PROJECT (right) are arranged in orderly groups of four over rolling hills.

AT END OF PAINT CONVEYOR (below) panels are laid on gravity conveyor to roll out to stock pile.

GASOLINE ENGINE-DRIVEN GENERATOR (below) of 5 kw. capacity, mounted on an old car chassis, supplies power for four power-driven tools in field. This was mostly for boring holes for floor panel anchor bolts and cutting vertical boards used below floor level.

On-the-Job Maintenance



UTILIZES METALLIZING TO REBUILD WORN EQUIPMENT PARTS

By WILLIAM C. REID, *Vice-President, Metallizing Engineering Co., Long Island City, N.Y.*

BY VIRTUE OF ITS SIMPLICITY, economy, broad applicability and proved effectiveness, metallizing has come into wide use in almost every industry for the repair and rebuilding of worn elements such as crankshafts, axles, impeller spindles, pistons, gear housings and innumerable other parts not readily replaceable. Up to the present, the process has been employed to only a limited extent by construction contractors and equipment distributors, although its widespread use in the running maintenance of tractors, trucks and other automotive equipment has clearly indicated its possibilities.

In these critical times when replacement parts are difficult to obtain and available machines must be utilized to the utmost, metallizing equipment on the job or in the repair shop can do much toward eliminating costly delays occasioned by unexpected breakdowns. It can do much, too, toward the conservation of materials required for replacements and the many man-hours of labor that go into their manufacture. Usually, repairs thus effected give a service life considerably longer than that obtained from the original part.

Metallizing Process

Metallizing is a method of applying any metal in wire form to any metallic, and many non-metallic, surfaces without the application of sufficient heat to set up heat strains and stresses or cause warpage in the original base material. Thus it is possible, and highly practical, to re-surface the bearings of crankshafts and similar parts without the necessity of preheating and post-annealing and straightening.

Dissimilar metals can, with due regard to electrolytic action, be applied one to another, such as steel to bronze and brass, steel to cast iron, and brasses and bronzes to steel or iron. This flexibility in application opens up many possibilities for conserving vital metals and applying hard, wear-resistant surfaces to softer-base metals.

By the metallizing process, the metal is applied in a finely atomized, semi-molten state. Wire of ⅛-in. diameter or 11 B & S gage, is automatically fed through a gun into the center of an oxyacetylene flame surrounded by an envelope of compressed air at 60 lb. per sq.in. pressure which atomizes the metal as fast as it melts and projects it at high velocity on to the surface being sprayed. Sketch No. 1 graphically illustrates the construction of the gun nozzle and its action in spraying the atomized metal.

Surfaces to be metallized are prepared by either of two common methods. Bearings and other cylindrical shapes are mechanically prepared in a lathe by first undercutting the worn section, grooving, and roughening the tops of the sections between grooves with a special rotary tool. These simple operations require little skill; they can be performed in any lathe. Flat surfaces, or sections that cannot be prepared in the above manner, are blasted with angular steel grits, flint sand or special non-metallic abrasives.

From this brief description of the preliminary operations, it will be seen that adequate surface preparation is necessary in order to obtain a secure bond for the sprayed metal. The basic requirements are: (1) a surface properly undercut; (2) a surface free from oil or moisture; and (3) a surface roughened mechanically or by blasting to assure the maximum keying or bonding effect.

Equipment Required

The metallizing gun is a small hand tool weighing only 4¾ lb. Accessory equipment, air filter and regulator, oxygen and acetylene regulators, hoses and the wire control unit, are of a definitely portable nature. They can be mounted completely on an ordinary gas-bottle truck or on any other wheeled equipment.

Compressed air is needed in volume of at least 35 cu.ft. per min. at 65-lb. pressure. Most contractors have shop compressors large enough for this purpose. Oxygen and acetylene or propane are required, and these gases are obtainable from regular suppliers. Sketch No. 2 shows the maximum amount of equipment required for a metallizing outfit. An air drying unit, shown next to the compressor in Sketch No. 2, is necessary only when the main air supply is particularly wet and oily.

In addition to the above, a lathe is required for preparing,

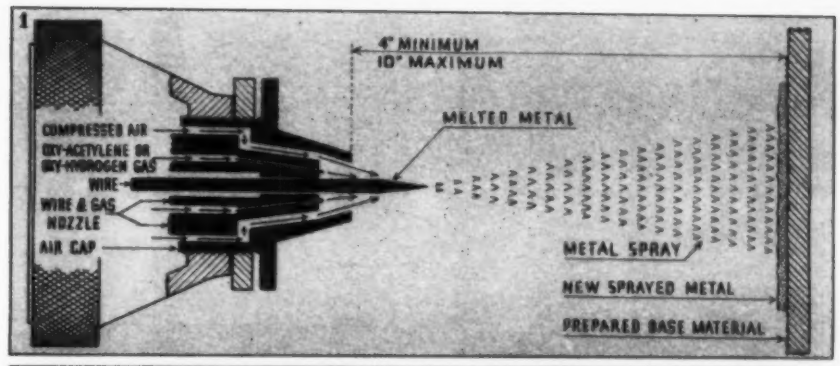
(Continued on page 54)

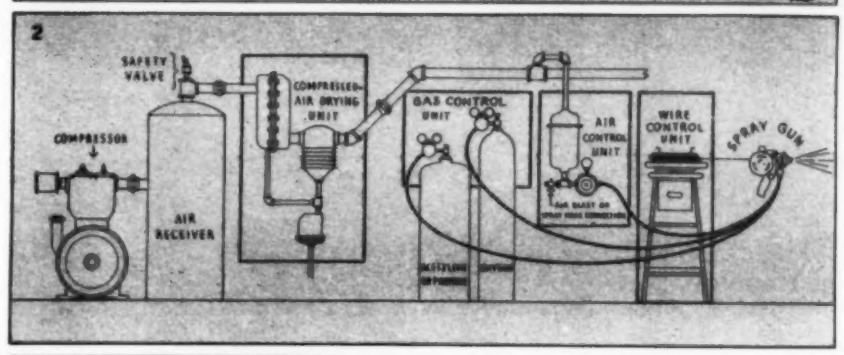
1 **AT NOZZLE** of metallizing gun, metal wire projected at controlled rate by air turbine in gun is melted by annular flame of oxyacetylene or oxy-propane. Annular envelope of compressed air atomizes molten metal and sprays it upon prepared surface set up at proper distance from nozzle.

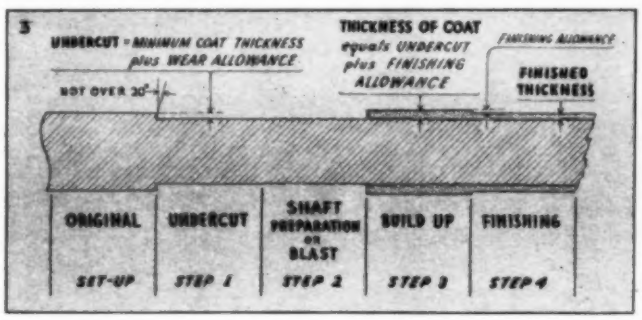
2 **COMPLETE EQUIPMENT** for metallizing work includes compressor capable of supplying 35 cfm. at 65 psi. and air and gas control units. Drying unit next to compressor is needed only where air is particularly moist or oily.

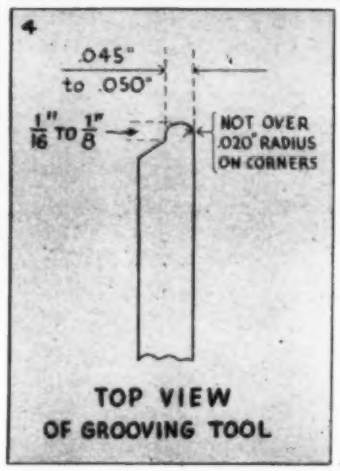
3 **SHAFT METALLIZING** involves four standard steps: undercutting, surface preparation, metal spraying and finish machining or grinding. These operations can be performed in any lathe.

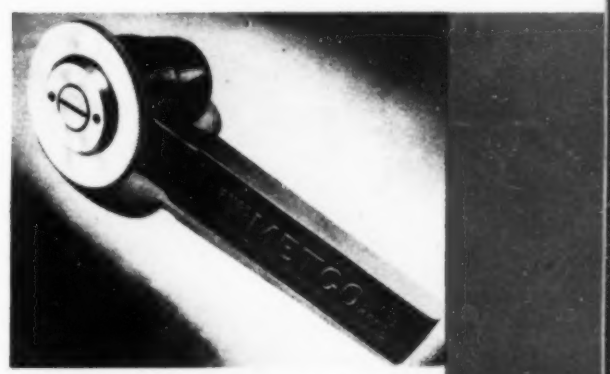
4 **FOR SURFACE PREPARATION** of cylindrical shapes, grooving tool mounted on lathe is used first to cut grooves for dovetailing sprayed metal.



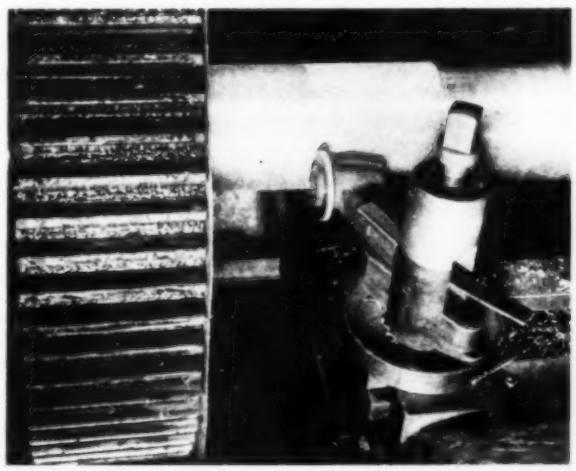




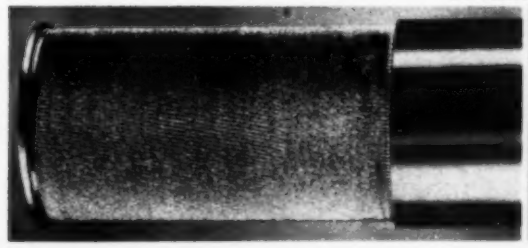




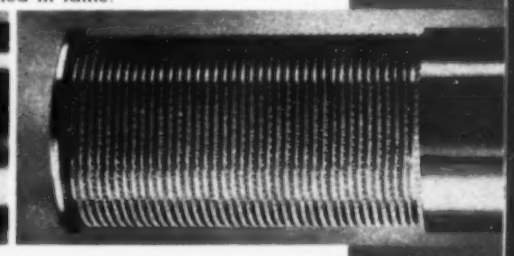
ROTARY SHAFT PREPARING TOOL set up on lathe may be used alone on cylindrical shapes to produce rough surface somewhat similar to that obtained by grit blasting. Latter method, of blasting with sand or steel grits, is employed on flat surfaces and large-area parts that cannot be turned in lathe.



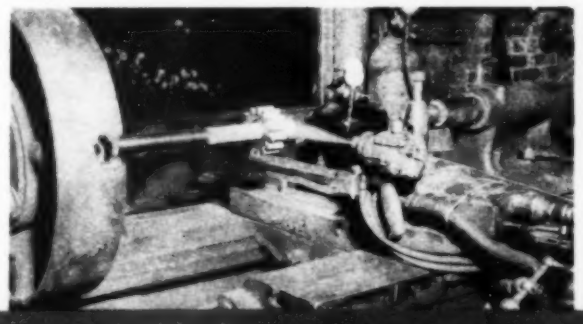
SET UP IN TOOL POST. rotary shaft preparing tool roughens undercut surface of drive axle to provide bond for sprayed metal. This axle has not been grooved.



ROUGHENED by use of rotary shaft preparing tool alone, shaft surface is ready to make good bond with sprayed metal, but it lacks grooves necessary for additional dovetailing effect. Surface prepared without grooves is suitable for press fit dimensions.



GROOVED AND ROUGHENED by both grooving tool and rotary shaft preparing tool, shaft surface will produce superior bond combining principles of dovetailing and adhesion.



OIL-PUMP DRIVE SHAFT (left) for 25-hp. tractor is built up with sprayed stainless steel on bearing sections.

WEIGHING ONLY 4¾ LB. (right), metal spray gun is compact unit which may be either held in hand or attached to tool post on lathe.

MOUNTED ON TOOL POST of lathe, metal spray gun builds shaft up to size for finish grinding or machining to original dimensions.

metallizing and finishing all cylindrical parts, and a blast cabinet or pressure-type blast machine if there is to be any volume of flat or large-area work. Ordinarily, a contractor who installs metallizing equipment for mechanical maintenance and repairs can handle nearly all his work on a lathe, with a small blast cabinet available for castings and similar parts which cannot be rotated.

What Metallizing Can and Cannot Do

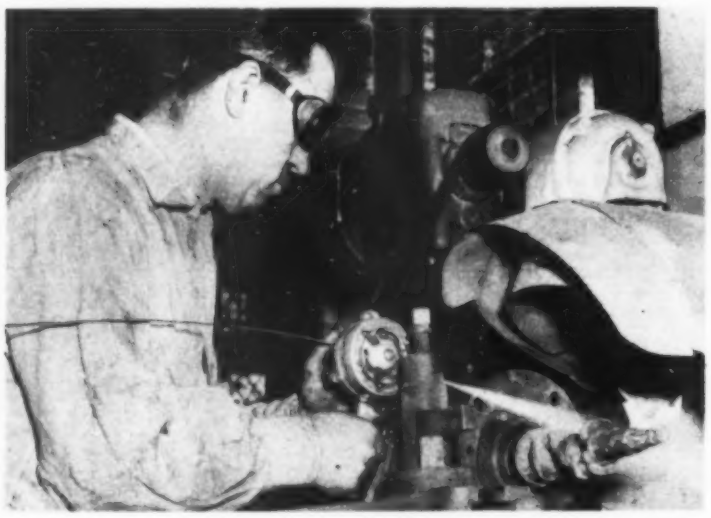
Like all maintenance processes, metallizing has definite limitations beyond which failures certainly will occur. First, it should always be remembered that sprayed metal is not actually fused to the metal to which it is applied; therefore, it depends for its adhesion on a "mechanical bond," the strength of which is entirely dependent upon the quality of the surface preparation.

Second, sprayed metal has a granular rather than a crystallized structure, and this characteristic indicates low tensile strength. Therefore, it is not used for: (1) Cutting or shearing edges; (2) conditions of severe impact; (3) overcoming structural weakness; or (4) joining broken or badly cracked parts. Eliminating repair jobs that come under these classifications, we have left an enormous variety of worn parts that can be effectively re-surfaced and restored to original dimensions.

Compressive strength of sprayed metal is almost equal to

(Continued on page 104)

WITHOUT DISMANTLING MACHINE. large diameter drive shaft of roll crusher in cement mill is restored to press fit by roughening bearing section with rotary shaft preparing tool **(left),** building it up with sprayed steel **(right)** and grinding to finished fit. Entire job is completed in 18 hr. Because metal spraying involves no appreciable application of heat, shafts and other machine elements can be restored by metallizing without setting up temperature stresses or causing crystallization of base metal.



METALLIZING GUN builds up worn bearing surfaces of air compressor used in air brake system of motor vehicle. To allow for unusually thick metallized coating on tough base metal, extra deep undercut is made by grinding. Surface then is prepared for spraying by grit blasting.

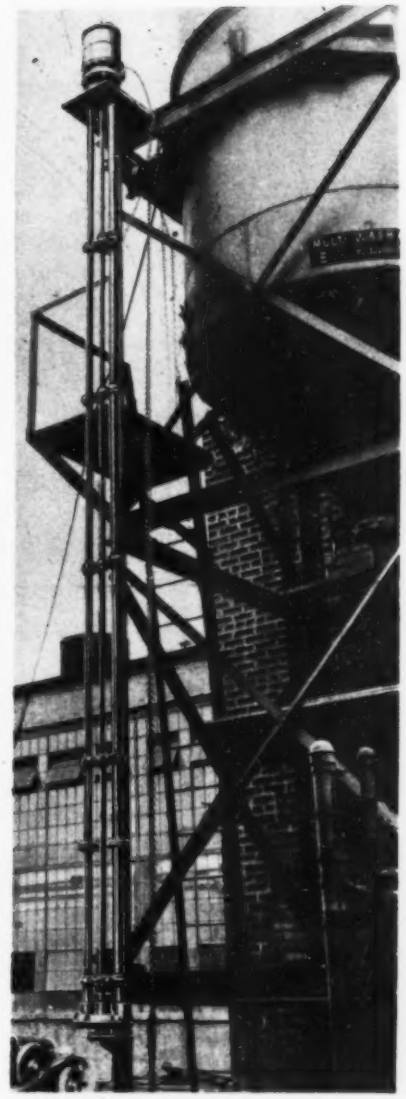
INSIDE BEARING SURFACES of steel wheel hubs are built up by metallizing with hard steel sprayed on to surface previously roughened by turning in lathe with (1) rough cutter and (2) rotary shaft preparing tool. Carboloy tool is used for machine finishing.

JOB oddities

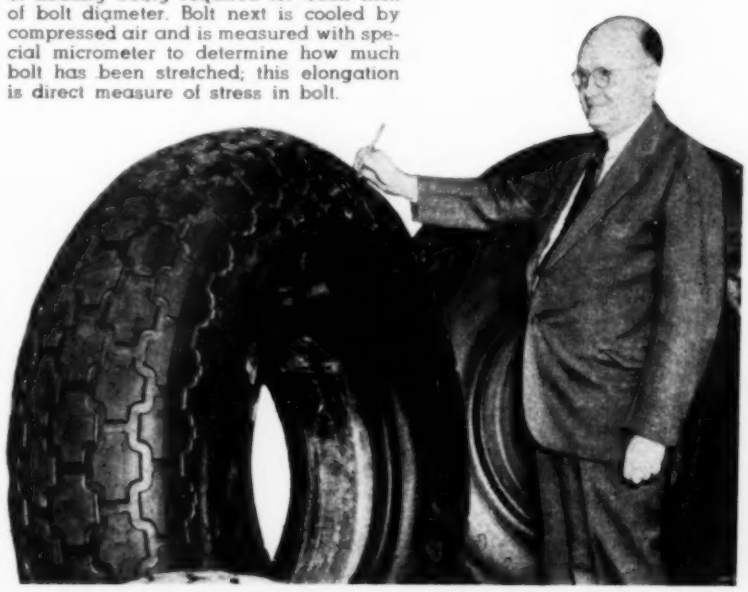
TO AVOID TWISTING STRAINS caused by tightening alloy steel bolt for high-pressure, high-temperature steam turbine with big wrenches and mechanical power, Westinghouse shop men first draw up nuts until they are snug and then insert 110-v. electric heater into hole in center of bolt. Heat causes bolt to elongate sufficiently for nut to be given pre-determined amount of additional turn, about 5 min. of heating being required for each inch of bolt diameter. Bolt next is cooled by compressed air and is measured with special micrometer to determine how much bolt has been stretched; this elongation is direct measure of stress in bolt.

HINGED WOODEN SOLES, with joint under instep, make walking easy for asphalt rakers on Phoenix, Ariz., asphaltic concrete streets laid at 225-275 deg. F. Sandals fit over working shoes.

Photo from Phoenix Republic and Gazette



HUNG UP FOR TESTING, 1½-in. Amsco-Nagle vertical shaft pump with overall setting of 25 ft. (designed to handle 50 gpm. against 48-ft. head) is suspended from dust collector tower at Chicago Heights, Ill., plant of American Manganese Steel Division for shakedown run before shipment to Western railroad which needed pump to overcome local water supply problem where heavy sand loading had caused trouble. No well of sufficient depth being available, Perry Nagle, pump designer, made use of tower to hang pump in vertical position.

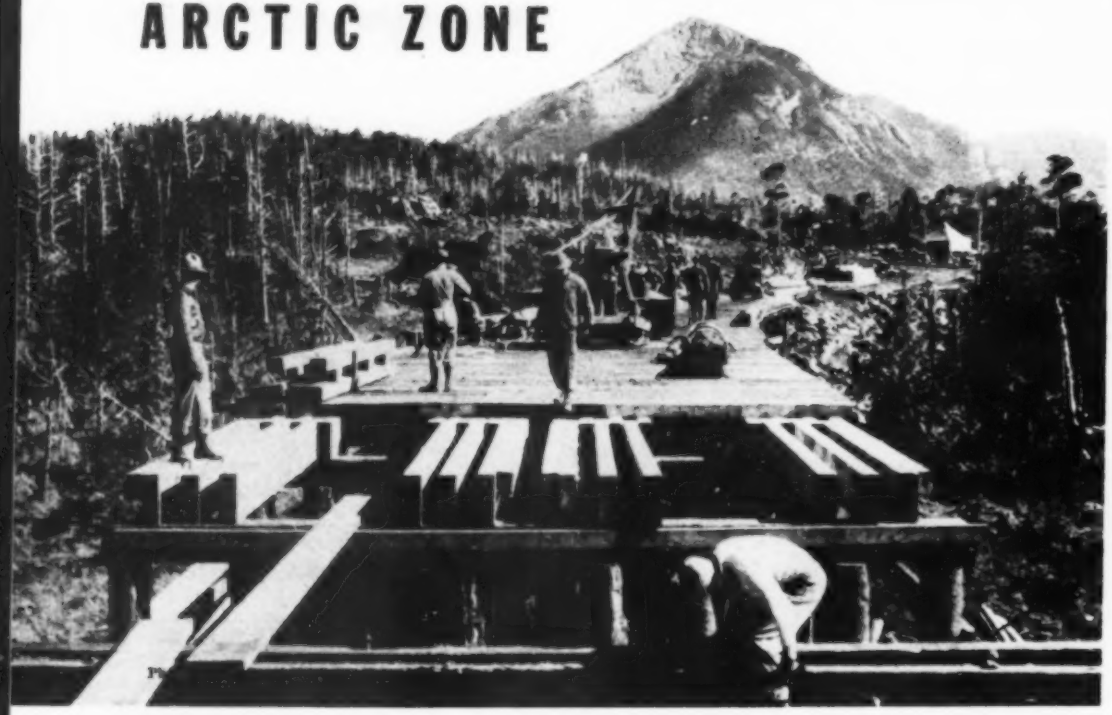


SAVING 70 LB. PER TIRE, redesign of shoes for wheeled scrapers by DENN M. BURGESS, vice-president and general manager, R. G. LeTourneau, Inc., conserves this much rubber on 18x24 tires and proportionate amounts on other sizes. Rubber reduction does not effect load capacity but cuts estimated working life from 30,000 to 20,000 hr., equivalent to 5 yr. in contracting or 10 yr. in Army. New design is expected to save 1,500,000 lb. of rubber in next year.

AIR RAID SHELTER for 5,000 persons beneath at least 200 ft. of rock is provided by iron ore haulage tunnel recently converted to this use at old Hibernian Mine in New Jersey. Tunnel is about 8 ft. square.

U.S. ARMY ENGINEERS RUSH WAR CONSTRUCTION IN

ARCTIC ZONE



TIMBER TRESTLE is constructed by Army Engineer troops as part of haul road from quarry at island landing field.

INCLINED CABLEWAY (below) delivers pipe for water supply construction from beach to top of slope near airplane landing field in forested area of northern latitude.

TRACTOR-BULLDOZER tackles tough job in stripping muskeg at end of airplane runway in Arctic Zone.

ROCK FILL ROAD (below) is being built from timber trestle by Army Engineers and hired labor.

MAJOR GENERAL EUGENE REYBOLD. Chief of Engineers, U. S. Army, directs war construction program of unprecedented size and scope.

TO SERVE THE NATION'S WAR EFFORT, the Corps of Engineers, U. S. Army, headed by Major General Eugene Reybold, Chief of Engineers, with Major General Thomas M. Robins, Assistant Chief in Charge of Construction, is directing the greatest and most diversified construction program ever undertaken by this or any other country. Involving dollar expenditures running into the billions, the work already completed and in progress runs the gamut of all types of construction, and extends over a geographical range in this and other lands so vast that it includes the Arctic, the temperate and the tropical zones.

The accompanying official photographs, approved for publication by the Office of the Chief of Engineers, U. S. Army, indicate, without disclosing specific locations, the varied character and extent of construction needed to meet the demands of global warfare within the continental limits of the United States and at various off-shore military and naval bases.

ARCTIC, TEMPERATE AND TROPICAL ZONES

MAJOR GENERAL THOMAS M. ROBINS, Assistant Chief of Engineers, is in charge of activities of Construction Division.

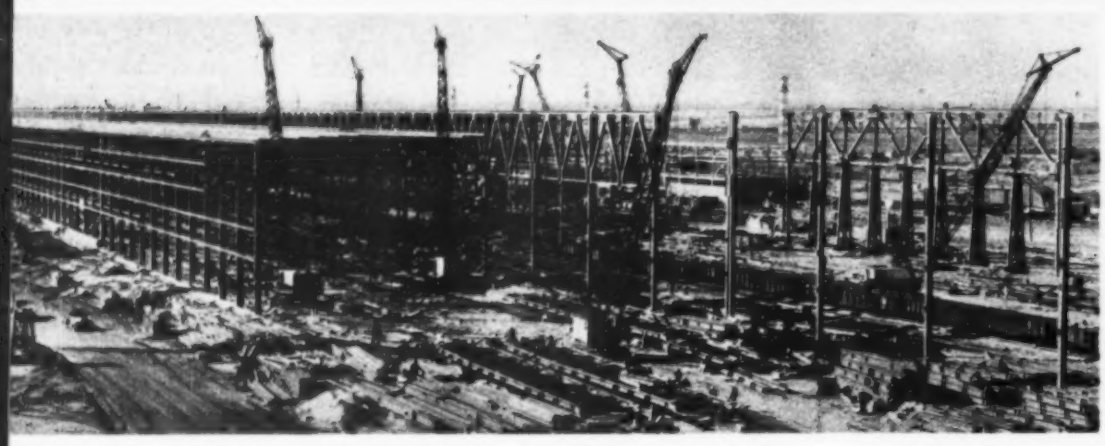
FILL IS DEPOSITED by trucks and spread by bulldozer for airplane runway. In background is surfaced emergency landing strip.

IN ARCTIC WILDERNESS Army Engineers rush war construction thousands of miles from supply bases despite inadequate transportation, sub-zero temperatures, and scarcity of skilled labor and materials. Here creek is being bridged with lumber felled at site and handled by tractor-crane rig.

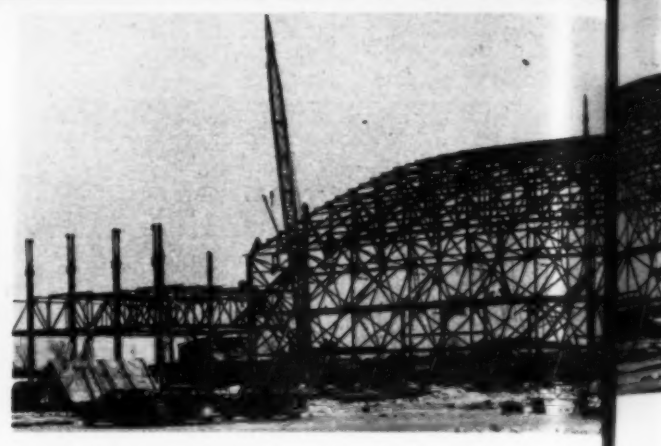
CAMP BUILDINGS (below), with regimental headquarters at lower right, are constructed by engineer troops and hired labor at Northern airport. Tractor-bulldozer grades main camp street.

HEAVY GROWTH OF TIMBER (below) and underbrush, characteristic of region in North, has to be cleared to provide site for airplane runway.

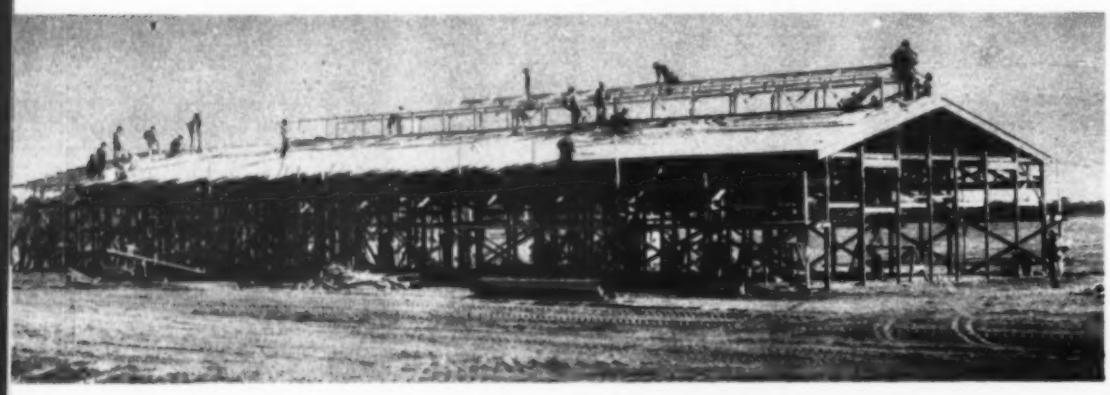
★ ★ ★ ARMY ENGINEER CONSTRUCTION



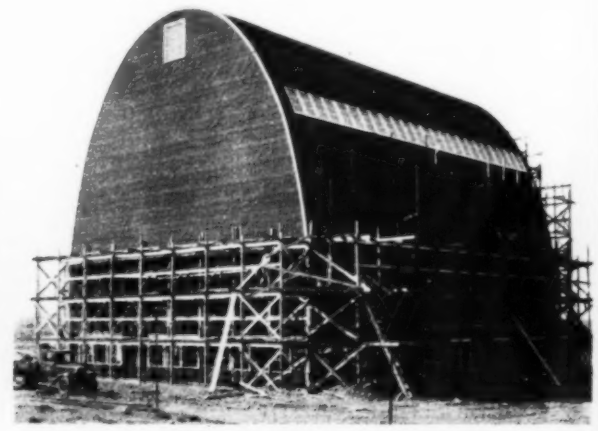
HUGE AIRCRAFT ASSEMBLY PLANT nears completion in Southwest as battery of longboom crawler cranes erect structural framework.



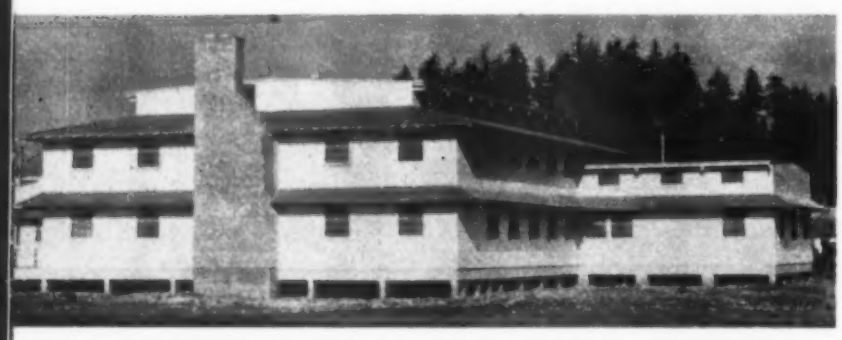
STEEL ARCH ERECTION is under way for big airplane repair building at Eastern air depot.



MOTOR REPAIR SHOP at ordnance plant in South is long, timber-frame structure.



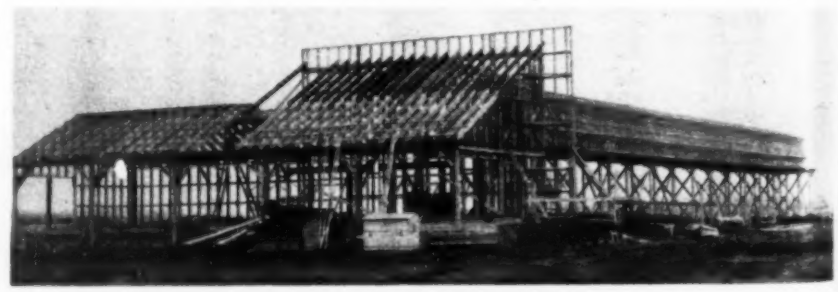
DOMED STRUCTURES OF ODD TYPE serve as test buildings at Signal Corps depot in South.



FOUR-HUNDRED BED HOSPITAL and dozens of other buildings were required by construction program at Fort Lewis, Wash.

CONCRETE IGLOOS for munitions storage are built at ordnance plant in Southwest. Plan provides for large group of individual units covered by earth blankets and spaced far enough apart to localize effect of explosion.

AT PORT OF EMBARKATION on Pacific Coast reinforced concrete pier is built.



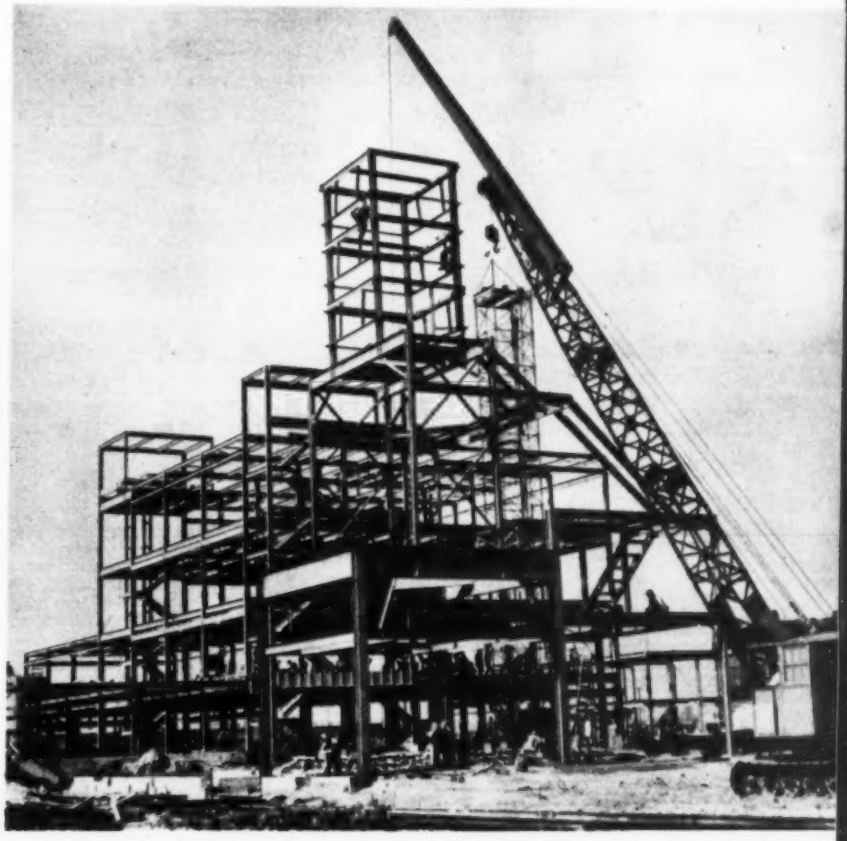
SPECIAL TIMBER FRAME STRUCTURE is erected to house blending tower and packing house at ordnance works in Southwest.

LONG, WIDE CONCRETE RUNWAYS (below) at Eastern air depot are finished with aid of Blaw-Knox equipment riding on steel road forms.

PROJECTS IN TEMPERATE ZONE

STANDARD TWO-STORY BARRACKS of timber construction at Fort Lewis, Wash. form background for grading of camp roads by Allis-Chalmers tractor hauling Woodridge carrying scraper.

TIMBER FRAMEWORK is bolted up to provide powder house at ordnance works in Southwest.

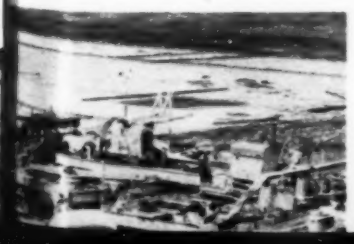


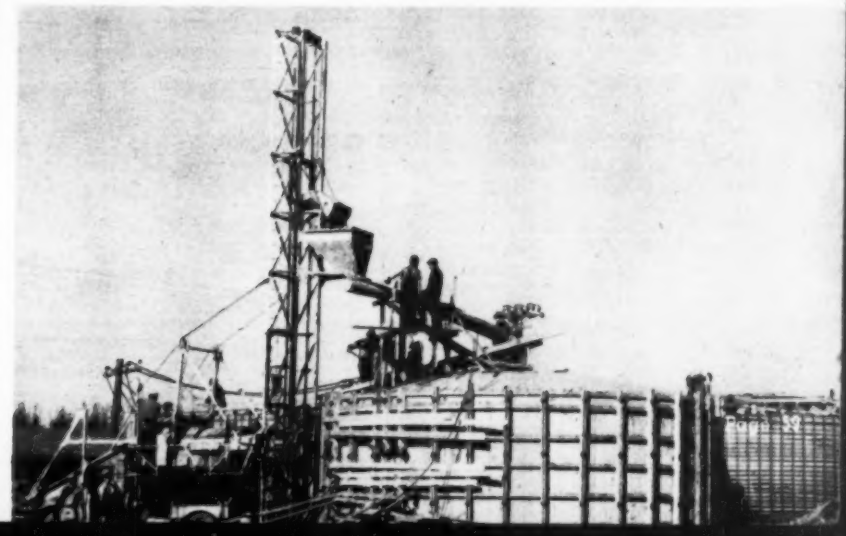
FOR CHEMICAL WARFARE SERVICE plant with framework of structural steel is erected with aid of Link-Belt crawler crane equipped with boom extension for extra reach.

AT BARRAGE BALLOON TRAINING CENTER in South two-story wood barracks of this type are provided to house personnel.

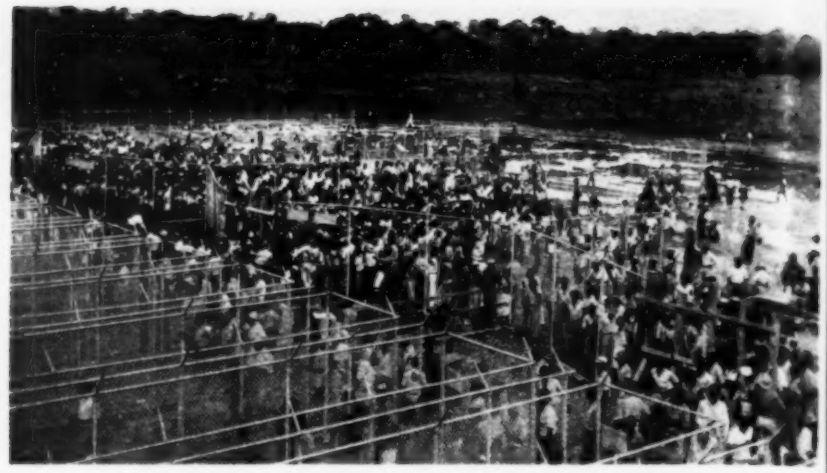
WATER SUPPLY SYSTEM (below) for army cantonment on Pacific Coast involves construction of circular concrete settling basins.

FOR RELIGIOUS SERVICES (right) chapels are constructed to serve troops at cantonment.

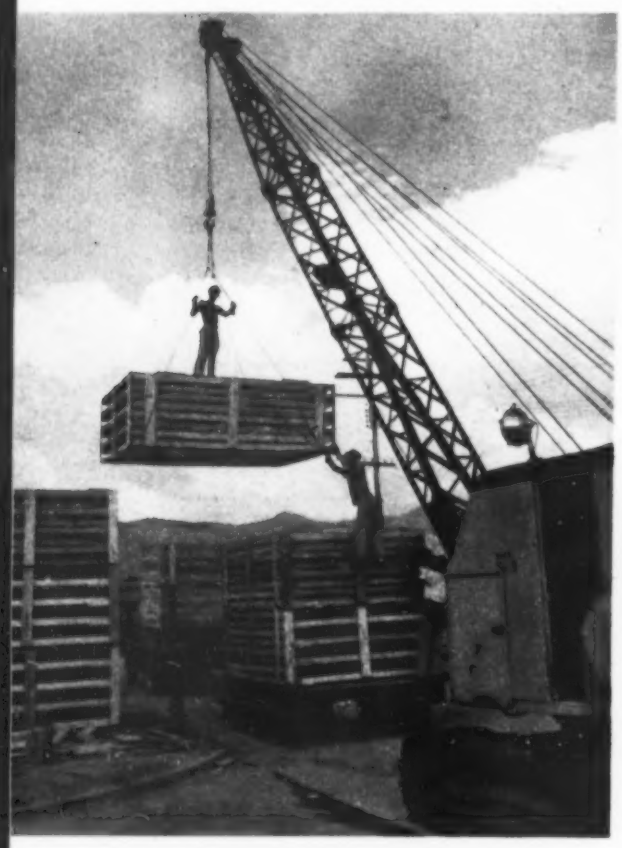




TROPICAL CONSTRUCTION CAMP consists of buildings on concrete stilts to provide ventilation and furnish protection against objectionable animal life. A few months before this picture was taken, site was dense jungle.



HERE'S THE PAYOFF on construction project at island base. Native laborers line up in front of wire fenced stalls to receive wages from American contractors as "ghost walks" on Saturday afternoon.

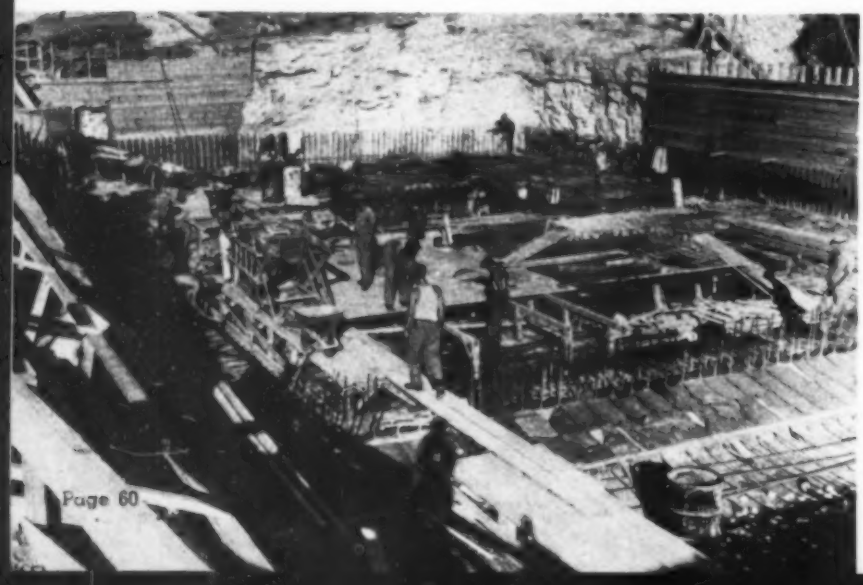


PREFABRICATED SECTIONS for building portable troop barracks at off-shore base are unloaded by crawler crane from truck-trailers.

BITUMINOUS SURFACING is applied to auxiliary airplane landing field at island base.

BASE IS PREPARED for parking apron at airplane landing field at island base.

CONCRETE RESERVOIR (below) is constructed for water supply at off-shore base.



FOR BRIDGE ABUTMENT (below) at island base, concrete is poured by tower and chute rig of American contractors.

...ROJECTS IN TROPICAL ZONE

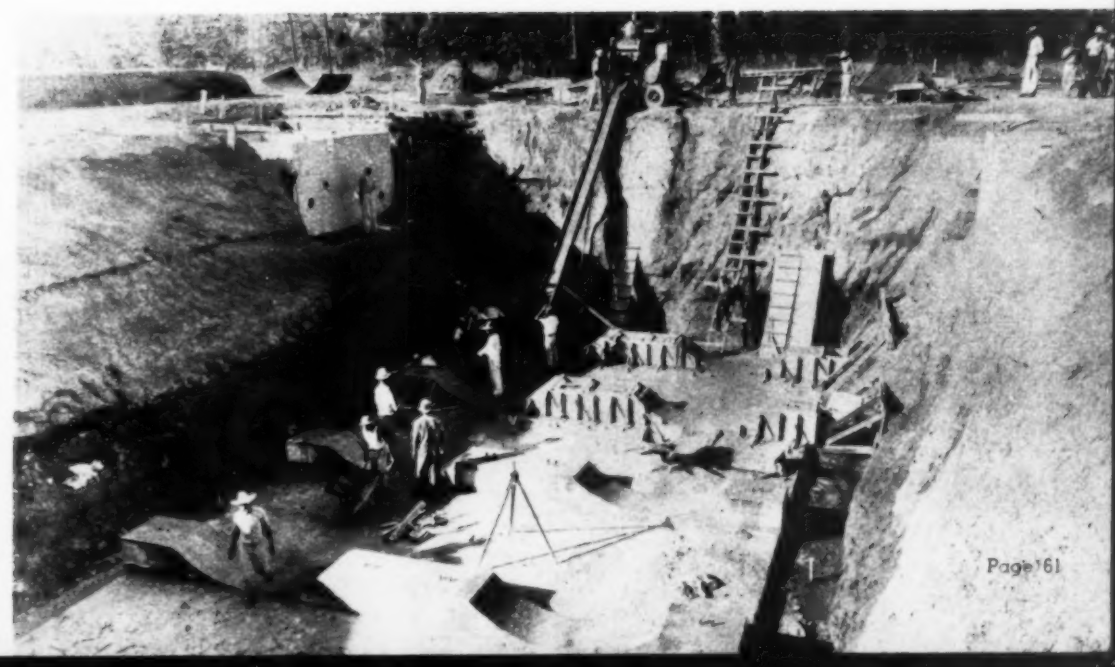
PALM TREES and rolling, landscaped lawn provide attractive setting for mess-hall built at island base.

PREFABRICATED PANELS speed construction of barracks by American contractors at off-shore base somewhere in Atlantic Ocean.

AT QUARRY IN TROPICS American made equipment drills holes for explosive charges.

THEATER BUILDING (below) is erected at cantonment in tropical zone to provide recreational facilities for construction workers and operating personnel.

GASOLINE STORAGE at airfield on off-shore base is provided by sunken steel tanks supported on concrete cradles **(right)** and covered with earth fill **(below).**



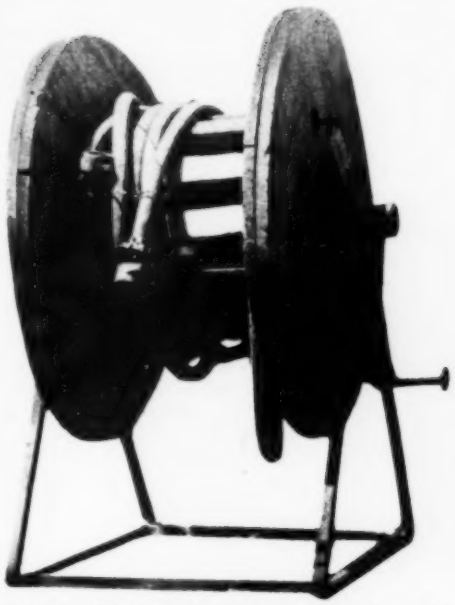
CRAWLER CRANES on night shift handle clamshell excavation and driving of vertical H-section piles for horizontal timber sheeting at Monroe-Adams station of State St. subway, Chicago, following installation of steel center columns and floor beams to support street decking, already placed between rails of car tracks. Kenny Construction Co., contractor for Chicago Department of Subways and Superhighways.

48-IN. SQUARE-BOTTOM GATE VALVE (below), one of largest in Colorado River Aqueduct distribution system, is installed by Los Angeles, Calif., Department of Water and Power below Lower San Fernando Reservoir to control flow from reservoir into new Stone Canyon inlet line and 54-in. San Fernando main. After valve has been set, reinforced-concrete foundation block is grouted under it. Richard Hemborg supervises installation by San Fernando Valley distribution division.

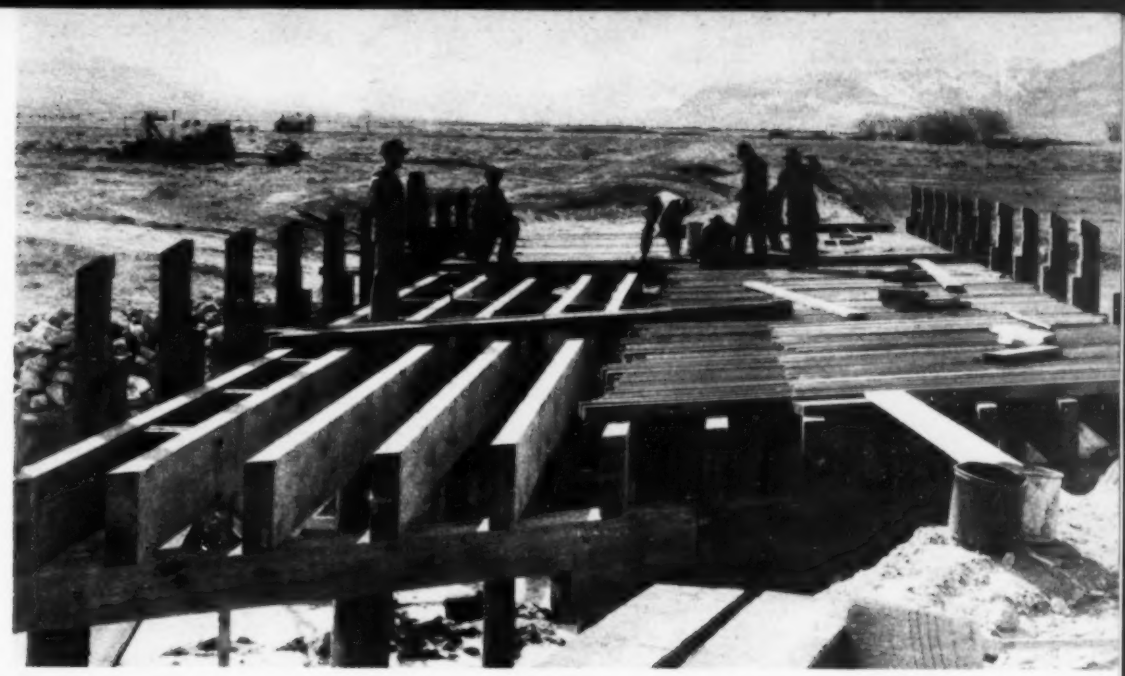
HOW *They Did It*

CONSTRUCTION DETAILS *For Superintendents and Foremen*

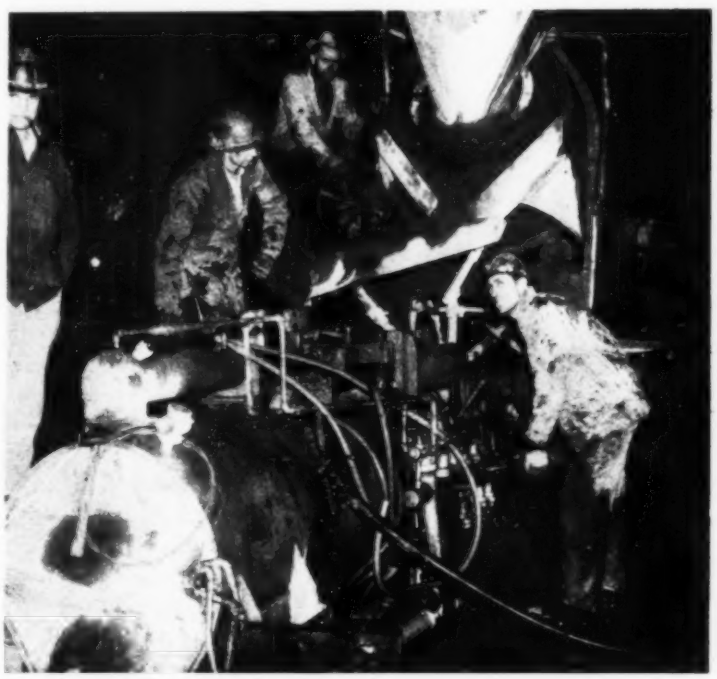
LUBRICATION TRUCK, equipped with small air compressor for grease-guns, services road-building equipment of Central Pennsylvania Quarry Stripping & Construction Co. on 8-mi. concrete highway project between Stroudsburg and Tannersville, Pa.



REEL FOR COMPRESSOR HOSE, made from old cable reel, is used on 8-mi. concrete highway project between Stroudsburg and Tannersville, Pa., by Central Pennsylvania Quarry Stripping & Construction Co., of Hazleton. Damage to hose is reduced and useful life is increased by this job-built reel.



TIMBER BRIDGE made up of three 23-ft. spans on 30-deg. skew is one of three constructed by Wyoming State Highway Department on 6-mi. project connecting with U.S. 20 near Cody. Structure utilizes creosoted 30- and 32-ft. bearing and wing piles with Wolmanized caps, stringers, bridging, spacer blocks, decking, curbs and posts fabricated and treated at Wauna, Ore., plant of American Lumber & Treating Co. Only railing timbers are untreated. Two intermediate bents are sway-braced. R. B. ZIPFEL (at far left), project engineer, is in charge of job for highway department.



RAILROAD TUNNELS on relocation around Shasta Dam by U.S. Bureau of Reclamation north of Redding, Calif., are lined by R. G. Clifford Co. with Hackley guns charged with concrete from Smith mixers to which trucks deliver batches inside tunnels.

Howard Collis Photo

METAL STOVEPIPES serve as pier forms on construction of Army barracks for Corps of Engineers by T. W. Cunningham, contractor, Bangor, Me., who later changes to laminated paper tubes for this work. Temporary inner frames stiffen 12-in. dia. stovepipes against crushing by backfill shoveled in cold weather over wood forms for 18-in.-square footings 1 ft. deep. When concrete cannot be placed until next day, stovepipe forms are kept warm during night by suspending kerosene lantern inside each form from board (with air hole in it) covering top opening; lantern hangs just above footing grade to prevent it from being extinguished by any water that might seep into form.

FIRE TRUCK (inset below), manufactured under war-time regulations for industrial, civilian and military use by Cardox Corp. and delivered to Cramp Shipbuilding Corp., is equipped with refrigerated tank holding three tons of liquid carbon dioxide under pressure, making unit independent of pumps and connections to water mains. Refrigerating unit on truck keeps liquid dioxide at 0 deg. F. Two hoses mounted on reels and equipped with nozzles and playpipes are used to extinguish fires, as shown by photograph **(below)** where 600 sq. ft. of blazing gasoline is put out in 58½ sec. without damage or contamination from extinguishment.

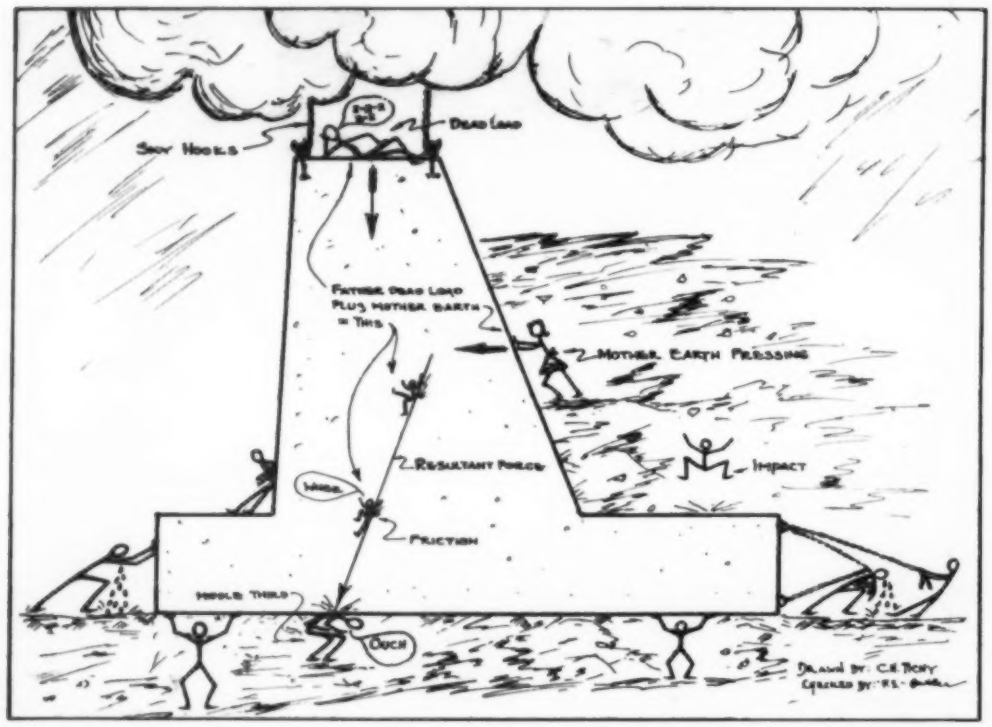
COLUMN FORM (right) measuring 39½ in. by 29 ft. and weighing 10,000 lb. with steel in place is lifted from truck and set in position by General hydraulically steered, one-man-operated Supercrane in less than 15 min. on contract of McRae Bros., Seattle, Wash., for new million dollar viaduct on Spokane St. in same city.

THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"When we start that defense construction job in Hawaii, I wanna be STRAW boss!"

"Take 'er up a bit higher, Mike!"



WAR PRIORITIES RETAINING WALL, *as conceived by C. H. TICHY, design draftsman for Chicago's Department of Subways and Superhighways, to eliminate use of critical materials.*

Trenchers

BROAD WOODEN CRAWLER TREADS and wide wooden wheel tires support this trencher in traveling over marshy ground. Machine is here excavating drilled and blasted coral rock on Matecumbe Key for [illegible] mi. steel-pipe aqueduct to Key West.

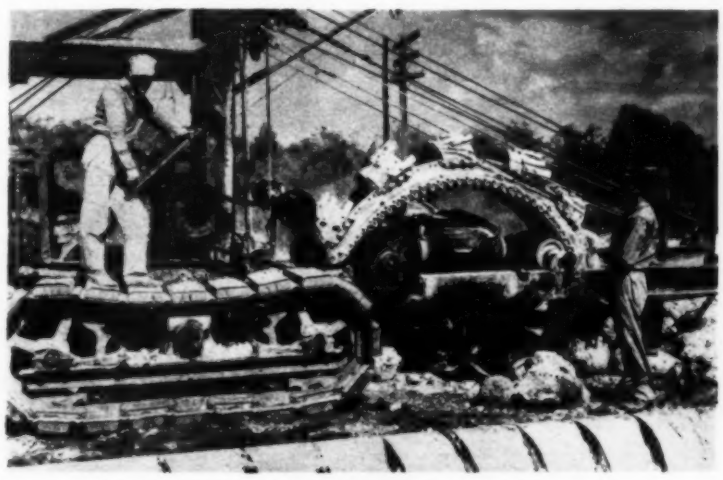
Dig Florida Rock for 128-Mile Key West Aqueduct

EXTENDING FROM THE MAINLAND out along the Florida keys to the southernmost tip of the United States, a new 128-mi. pipe line will deliver 5 mgd. of fresh water to Key West, Fla., for use by the expanded Navy personnel and the civilian population of that locality. Up to the present, only rain-filled cisterns and tank trucks have furnished fresh water to the community on the frost-free coral island. From wells previously tested for volume output at Homestead, Fla., a pumping station will be able to deliver through the new 18-in. steel pipe line an adequate supply for all purposes at Key West.

William. Bros. Corp., well-known pipe-line contractor of Tulsa, Okla., is building the new line with pipe supplied by the Youngstown Sheet & Tube Co. and the American Rolling Mill Co. Two Buckeye trenchers capable of cutting trenches

(Continued on page 108)

APPROACHING CITY OF KEY WEST on coral island of same name, aqueduct trench parallels Roosevelt Boulevard. Line can deliver 5 mgd. for Navy and civilian consumption.



TO SPEED DIGGING of pipe-line trench for Key West Aqueduct, constructors blast rock to be excavated by trencher. This machine, at work on Cudjoes Key, has treads of normal width. Trenchers can dig unblasted coral rock, but use of explosives to break rock makes for faster progress.

RANDOM LENGTHS (below) of 18-in. O.D. steel pipe up to 50 ft. long are stored at Homestead, Fla. Pipe has centrifugally spun bituminous enamel lining and exterior enamel coating covered by wrapping. Line is assembled with Dresser couplings on ground alongside trench in continuous operation, is hoisted over trench by pulley blocks on welded A-frame horses and is lowered progressively as work advances.

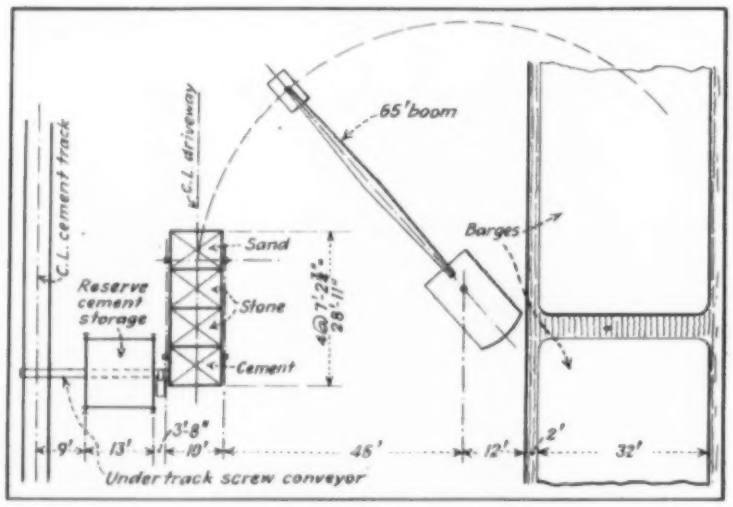
Well-Planned

Batch Plant

Handles Large Output

COMPACT PLANT, erected on waterfront to handle barge delivery of aggregates, charges truck mixers with 4-yd. batches at continuous average rates of 95 to 100 cu.yd. per hour. Bulk cement unloaded from railroad hopper cars goes into cement bin above batcher. Overflow pipe from this bin delivers excess cement to reserve storage bin at right, between plant and railroad car.

SKILLFUL, FORESIGHTED LAYOUT of a compact batch plant on a seacoast project for the Navy has enabled the plant over a period of many months to charge 4-yd. batches into truck mixers at consistent average rates of 95 to 100 cu.yd. an hour, exceeding its designed capacity of 90 cu.yd. an hour. Originally built to supply some 50,000 cu.yd. of concrete for the first contract on the site, the plant has since given the contractors uninterrupted service in putting out more than 180,000 yd. required by expansion of the job and is expected to do another 100,000 yd. in future work. The plant was set up adjacent to a waterfront bulkhead to permit unloading of sand and coarse aggregate directly from barges.



EFFECTIVE LAYOUT of waterside batching plant gets maximum service out of small area and enables equipment to maintain outputs ranging up to 1,500 cu.yd. of concrete in 16 hr.

As noted on an accompanying plan, a crawler crane operates in the space between the bins and the bulkhead. To facilitate the charging of bin compartments by this crane, the bins are arranged with their long dimension parallel with the bulkhead. For efficient operation, this layout requires that truck mixers drive through the bins in the long direction. To clear this driveway for the truck mixers, the contractors removed diagonal members bracing the supporting legs at the two ends of the bins and reinforced the steel legs to stiffen them. This was the only change made by the contractors in the standard equipment used for the plant.

Bins and Batchers — In the plant, materials are handled through Butler bins and batchers. The aggregate bins have three compartments with a capacity of 27 yd. each (without batter boards); two are used for coarse aggregate (¾-in. gravel or stone), and one is used for sand. Bulk cement, delivered in hopper-bottom railroad cars on a spur track, is unloaded into a 165-bbl. bin above the batcher; the overflow

(Continued on page 100)

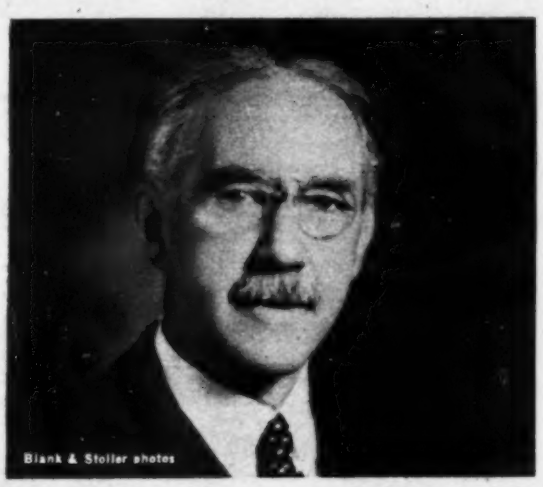
2-YD. CLAMSHELL CRANE unloading barges and charging bins is aided by tractor bulldozer which pushes stockpiled materials within range of bucket.

Present and Accounted For...A PAGE OF PERSONALITIES

GRANBY DAM DIVERSION TUNNEL 1,000 ft. long for U.S. Bureau of Reclamation's Colorado-Big Thompson project is driven at Granby, Colo., by MYRON L. BESSWICK (left) general superintendent, and F. A. (Al) HUNTINGTON, in charge of job for Platt Rogers, Inc., holder of $283,000 contract. These men formerly were in charge of advancing West Portal of Continental Divide tunnel 6,600 ft. on same project for Rogers.

MASTER MECHANIC for Central Pennsylvania Quarry Stripping & Construction Co., of Hazleton, Pa., on 8-mi. three-lane concrete highway 33 ft. wide between Stroudsburg and Tannersville, is MARTIN F. DELLAGO. Because of steel shortage slab is designed without reinforcement and has thickness of 9".

CARGO PLANES are going to be built hard way, if government agencies cannot open door to easy way, according to HENRY J. KAISER, veteran constructor and dam builder, whose Pacific Coast yards have recently turned out Liberty ships, ready for sea, in 38 days' total construction and outfitting time.



Blank & Stoller photos

FORTY YEARS IN BUSINESS and growing stronger every day, Turner Construction Co. this year celebrates the execution of more than half a billion dollars worth of contracts and concentrates its current efforts on war work under leadership of HENRY C. TURNER (left), chairman, and J. ARCHER TURNER, president.

E. A. HOLBROOK, dean of Schools of Engineering and Mines, University of Pittsburgh, is this year's president of National Society of Professional Engineers. Dean Holbrook holds engineering degrees from Massachusetts Institute of Technology and University of Illinois. He is former assistant director of U. S. Bureau of Mines.

PRIME MOVERS ON FOUR TVA WAR PROJECTS

G. E. MURPHEY
Construction Superintendent
Fontana Dam

H. L. BROADFOOT
Construction Engineer
Kentucky Dam

C. E. BLEE
Project Manager
Fontana Dam

J. K. BLACK
Project Manager
Kentucky Dam

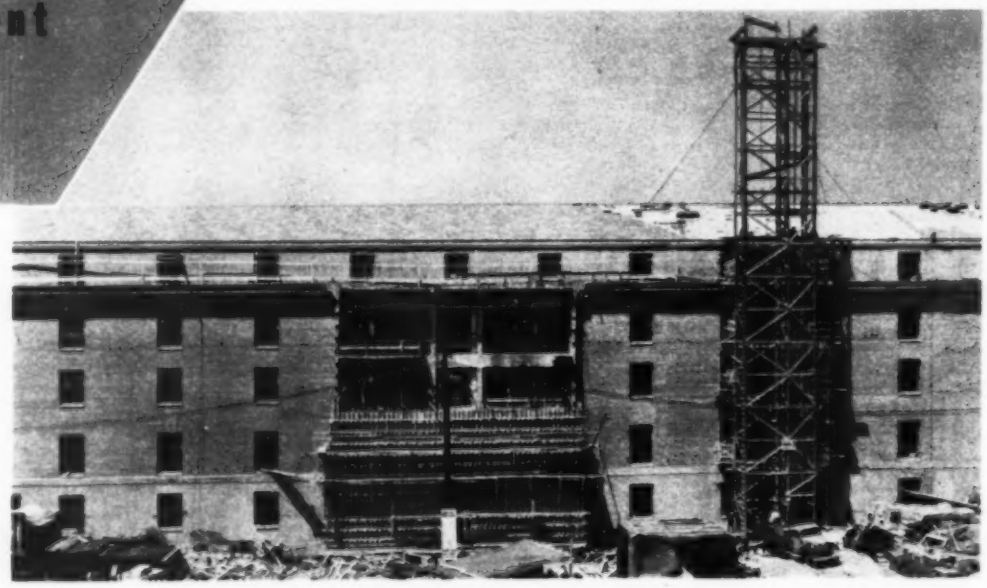
J. B. HAYS
Project Manager
Watauga and South Holston Dams

HUGE WAR DEPARTMENT OFFICE BUILDING across river from Washington provides 4,600,000 sq. ft. of floor area in five sides of pentagonal-shaped structure surrounding central court. Construction involves 2,000,000 yd. of borrow, 800,000 yd. of dredged excavation, 42,000 concrete piles, and 450,000 yd. of concrete.

Pentagon

Takes 450,000 Cu. Yd. of Concrete for War Department Offices

EXPOSED ARCHITECTURAL CONCRETE (below) on inner walls facing court is placed against forms consisting of rough, horizontal boards with edges carefully rounded to produce fins. Outer walls are faced with limestone.

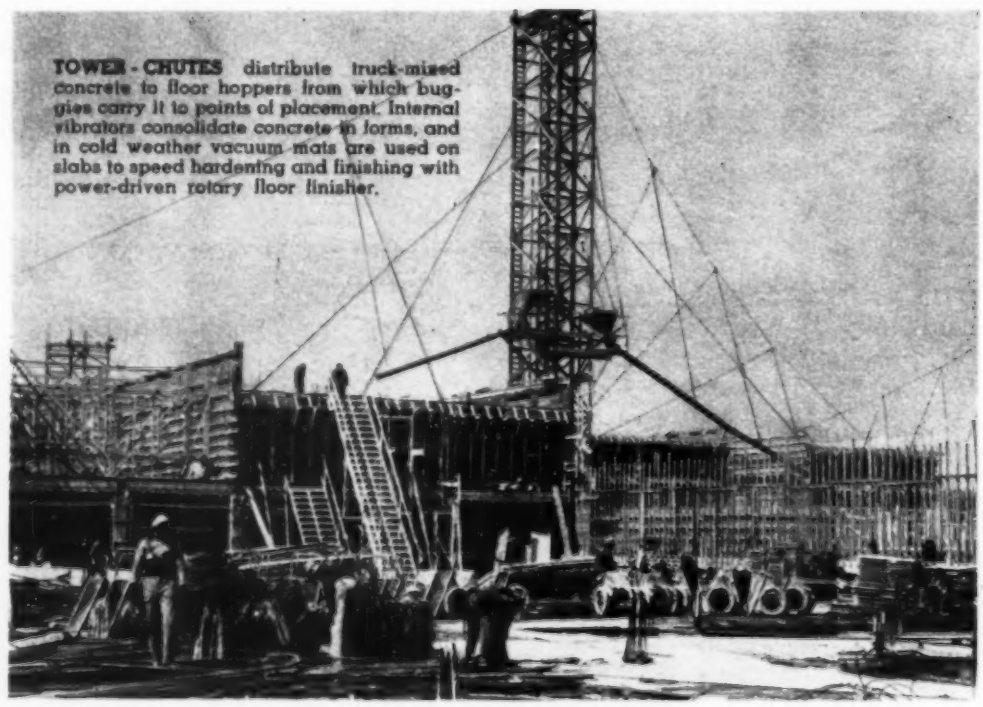


ACROSS THE POTOMAC RIVER from the National Capital, a group of three contractors — John McShain, Inc., Philadelphia, and Doyle & Russell and the Wise Contracting Co., Inc., Richmond, Va.— have pushed construction under direction by the Corps of Engineers, U. S. Army, of the huge reinforced-concrete Pentagon in Arlington, Va., providing 100 acres of floor space for War Department offices, at a speed which opened the first 600,000 sq.ft. to occupancy eight months after the start of the job, six months ahead of schedule, and turned a second equal area over for use 33 days later. This speed record is better appreciated when it is understood that the first eight months saw 2,500,000 cu.yd. of earth moved, 40,000 step-tapered cast-in-place concrete piles installed and 225,000 cu.yd. of concrete placed. Total concrete requirements amount to 450,000 cu.yd. The final section of the building is expected to be ready for occupancy in November.

100 Acre Building

Well described by its name, the building is pentagonal in shape, comprising five sides around an inner court. Outer walls of the five sides are each 921.6 ft. long (making the complete periphery nearly a mile in length), and inner walls are 360.8 ft. long. Depth of these segments, perpendicular to the inner and outer walls, is 386 ft. Three and four stories in height, the building is expected

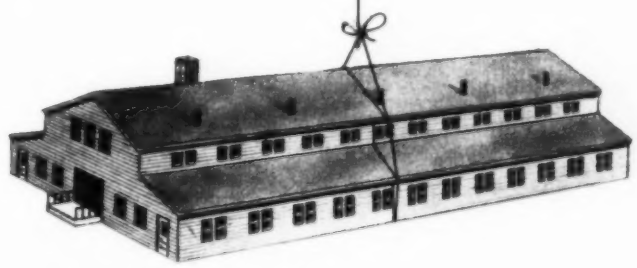
(Continued on page 100)



TOWER-CHUTES distribute truck-mixed concrete to floor hoppers from which buggies carry it to points of placement. Internal vibrators consolidate concrete in forms, and in cold weather vacuum mats are used on slabs to speed hardening and finishing with power-driven rotary floor finisher.

When closing A Contract *Hangs by a Thread*

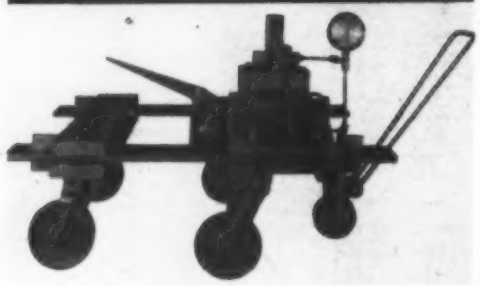
The winning margin between closing and losing a contract often is a matter of *speed* and *economy*. Timber and the TECO Connector System of Construction offers both. Fabricating plants across the country are ready to help *you* speed construction schedules.



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.

Timber
ENGINEERING COMPANY
Washington, D. C. ***Portland, Oregon***

TAKE THIS PRESS RIGHT TO THE JOB . . . IT'S *Portable*



VULCAN
Portable Hydraulic
PRESSES
ARE INDISPENSABLE IN THE SHOP AND ON THE JOB

and can be adapted to many uses on construction projects such as for gears, sheaves, wheels, crank discs, and crank pins.

Use it indoors or outdoors. Supplied with a lifting chain, it can be quickly slung up and taken down.

All brass pump plus simple, sturdy construction assures trouble-free long life. The gauge is graduated, indicating the total tons on the ram as well as the pounds pressure per square inch.

VULCAN
Portable Hydraulic
PRESSES

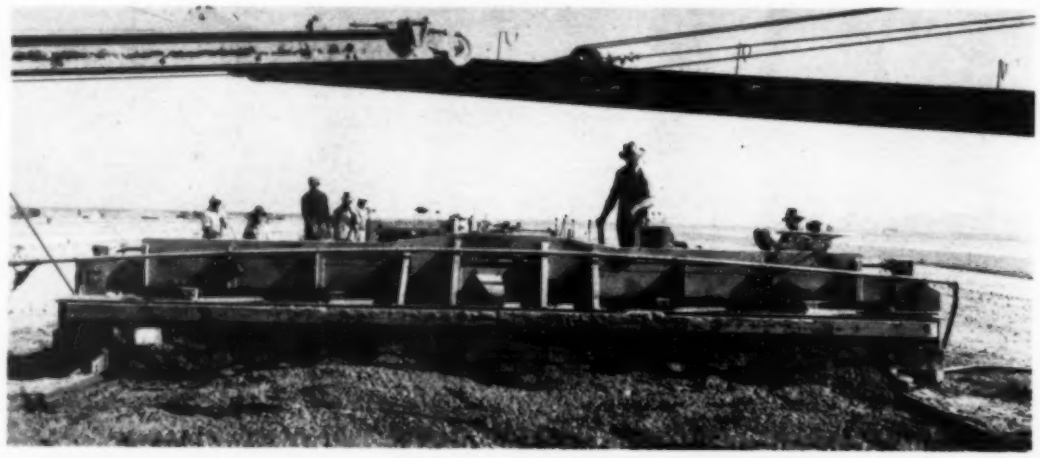
are available in 60-ton capacity, 6-in. ram diameter, 850 lbs. standard bars, and in 100-ton capacity, 7¾-in. ram diameter, 1550 lbs. standard bars. Quotations will be given on special side bars.

Write for Bulletin No. 10

VULCAN IRON WORKS Since 1852
331 North Bell Avenue
Chicago Illinois

CONSTRUCTION EQUIPMENT NEWS

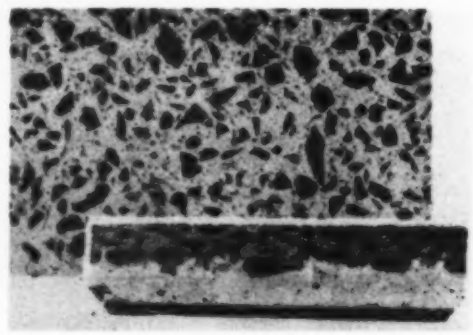
Review of Construction Machinery and Materials for SEPTEMBER, 1942



TRANSVERSE BLADE CONCRETE SPREADER, according to its makers, has played an important part in expediting slab production on airport runways, taxi ways and aprons, having on some projects handled maximum simultaneous output of three 27-E paving mixers or two 34-E dual-drum pavers. Features: (1) Mechanical means for spreading moves concrete transversely and longitudinally ahead of machine at same time; (2) spreading is automatic; (3) spreading blade and strike-off plate behind it are independently adjustable for height of spread; (4) narrow machines convertible to wide machines and vice versa; (10-ft. spreader will extend to maximum width of 15 ft. and 20-ft. maximum width of 25 ft.); (5) traction is positive because spreading blade is continually clearing path for forward motion of machine; (6) spreader does not segregate concrete, regardless of maximum size, coarse aggregate or harshness of mix; (7) handles concrete deliveries from truck mixers as well as from paving mixers; (8) paving spreader does not disturb steel center joints or prefabricated transverse joints during spreading operation; (9) vibratory attachment is spring suspended from machine and is operated by same engine and transmission that drives spreader.—**Blaw-Knox Co., Blawnox, Pa.**

★ ★ ★

NON-SLIPPERY FLOORING, known as Cortland Emery Aggregate, is mixture of scientifically graded large and small, sharp, hard particles of mineral emery rating next to diamond in hardness. Aggregate is mixed with Portland cement and water and applied as floor topping, said to provide firm nonslip surface, even when wet. Quality claimed to improve with wear and to become safer with use because as rough emery particles are exposed by wear, their gripping action improves. Where loads are moved by hand-trucking operations, much greater pushing traction is obtainable. In addition, it is claimed, this flooring greatly increases load-bearing qualities. Specimen of this mixture said to support load of more than 14,000 lb. whereas test specimen of ordinary concrete floor mixture will break under load of 6,200 lb. Heavy, loaded trucks not able to destroy surface, according to manufacturers, and hardness of emery particles claimed to be extremely wear resistant. High tensile strength is another feature of floor's serviceability. Moving wheels exert tractive pull as well as pressure on floor surfaces. Cortland Emery Aggregate floor surface is claimed to stand more than 1,000-lb. tension while ordinary concrete floor breaks at 620-lb. tension.—**Walter Maguire Co., Inc., 330 W. 42nd St., New York City.**



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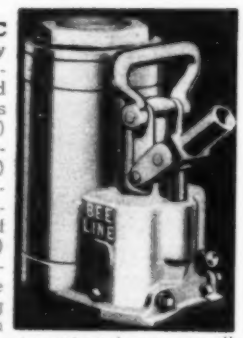

50-TON HYDRAULIC JACK, built especially for work requiring compact unit of light and sturdy construction, has following features: (1) Improvement in hydraulic efficiency; (2) large oil ports and passages assuring quick return of ram and lack of air-bound trouble; (3) simple construction — fewer parts; (4) large pressure areas requiring less oil pressure per ton of lifting capacity; (5) automatic take-up on all packing—nothing to adjust or tighten; (6) 50 percent overload guarantee; (7) built of high strength alloy material to assure maximum efficiency. Total weight, 74 lb.—**Bee Line Co., Davenport, Iowa.**

P&H Hydraulic Control

SAVES TIME - MANPOWER

LOW PRESSURE HYDRAULIC CONTROL gives you quick, positive response for smoother operation—*cushioned action* — easier on both machine and operator.

ROLLED ALLOY STEELS, all welded, give them greater strength per pound of weight — greater resistance to shock loads.

TRUE TRACTOR TYPE CRAWLERS mean smoother, trouble-free travel — freedom from crawler troubles.

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MORE FOR YOUR EXCAVATOR DOLLAR

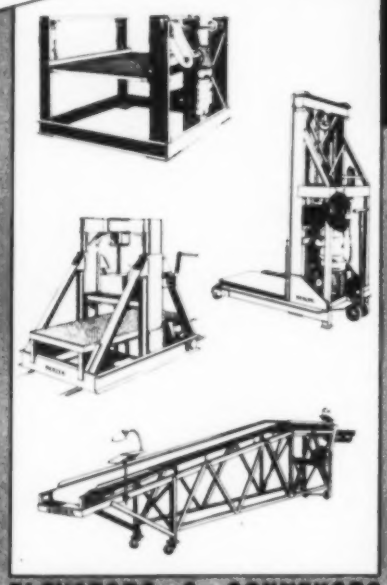
Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.

MERCER

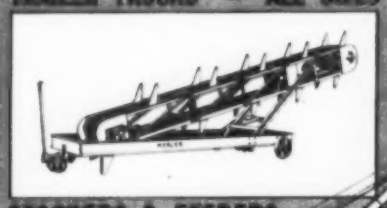
"THE NAME THAT CARRIES WEIGHT"

Industrial MATERIAL HANDLING EQUIPMENT

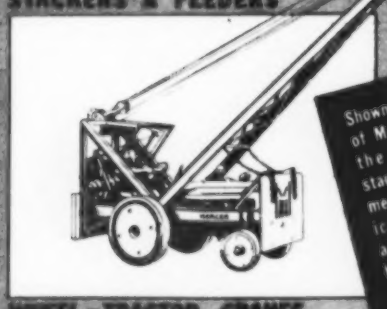
TRAILER TRUCKS — ALL SIZES



ELEVATORS & CONVEYORS

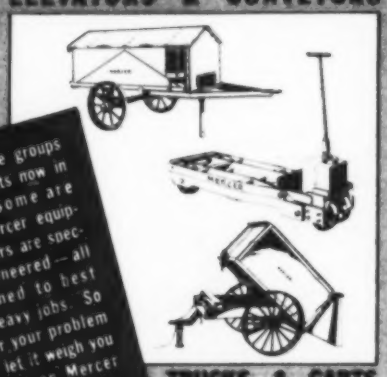


STACKERS & FEEDERS



WHEEL-TRACTOR CRANES

Shown here are groups of Mercer units now in the field. Some are standard Mercer equipment—others are specifically engineered—all are planned to best handle heavy jobs. So whatever your problem—don't let it weigh you down. Call on Mercer for a lift!



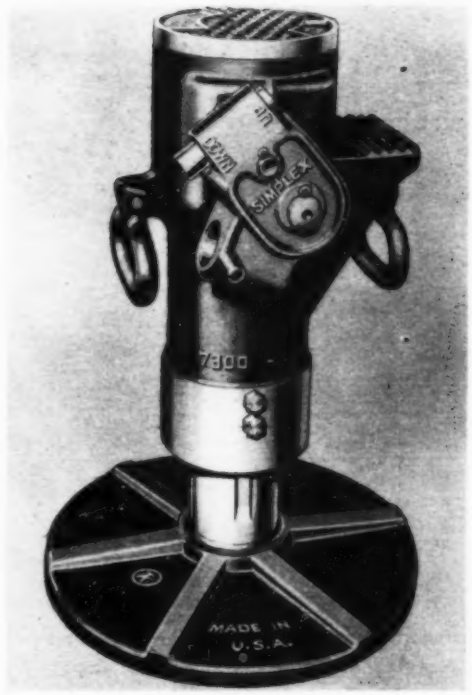
TRUCKS & CARTS

MERCER ENGINEERING WORKS, INC.

Works: Clifton (Allwood), N. J.

Sales Office: 30 CHURCH ST. • *Export Office:* 80 BROAD ST.

NEW YORK



25-TON BALL-BEARING SCREW JACK, standard speed, bevel gear, is claimed by its manufacturer to be an ideal tool for heavy-duty lifting, lowering and skidding work because of its safe mechanical action, screw adjustment and inclosed ratchet mechanism combined with both toe and cap lift. Toe lift is minimum of 11 in. from base, but jacks can be made with toe in any position to suit users' requirements, and base design can be modified. Guaranteed to lift its full rated capacity of 25 tons on cap and 12½ tons on toe. Has full 6-in. lift and weighs only 82 lb. complete.—**Templeton, Kenly & Co., 1020 S. Central Ave., Chicago, Ill.**

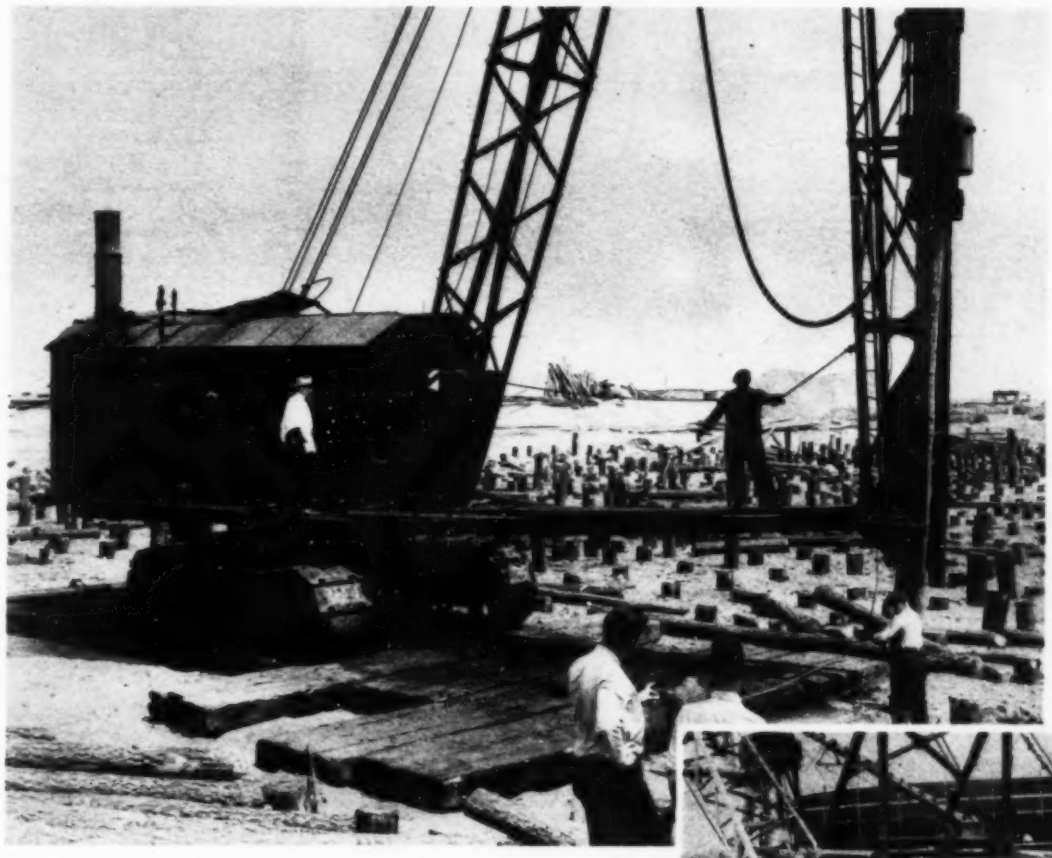
★ ★ ★

CONDUCTIVE ASPHALT TILE containing no critical materials, is said to be especially suitable as resilient flooring in arsenals, sheli and bomb loading plants, powder plants, temporary field hospitals and in various other industries in which static electricity presents safety hazard. New tile provides surface condition which results in less than .1 megohm resistance to static electricity under certain specific conditions. Recommended

size is 18x24 in., as its use minimizes number of joints in an installation. Material weighs approximately 93 lb. per 100 sq.ft. in ⅛-in. thickness, about twice that in ¼-in. thickness and about three times that in ⅜-in. thickness. Material 3/16 in. thick weighs about 139 lb. per 100 sq.ft. Tiles are hand laid tightly together, one at a time, so that sufficient contact is made between tiles to assure satisfactory conductivity. Welding is designed to prevent any harmful or explosive material from working into joints. Proper procedure in welding is first to draw pointed edge of iron along joint (always toward workman for better control) to fuse tiles. V-joint which results is then eliminated by using iron turned on flat side to give flat finish joint.—**Armstrong Cork Co., Lancaster, Pa.**

Gulf Quality Lubricants and Fuels

help prevent delays on large sewage disposal project



E. W. Foley, Inc., of New York, N. Y., is the contractor on this $2,000,000 sewage disposal project, located in Brooklyn, New York. The contractor's operations include excavating, grading, pile driving, form erection, and concrete work. Rapid progress is being made, thanks in large part to the efficient, trouble-free operation of the many units of equipment with Gulf quality lubricants and fuels.

"With Gulf Products in service, we get better performance from our equipment and avoid mechanical troubles"

Says Contractor

"GULF lubricants and fuels are a big help on a tough job like this," says the contractor on large sewage disposal project. "Our equipment delivers better than rated performance, and we haven't had a single mechanical delay since we began operations. Since we have a large number of pieces of equipment in service, we believe this is quite a record."

Are you entirely satisfied with the recent operating record of *your* equipment? If not, make sure that on your next job you get the benefits obtained with Gulf lubricants and fuels. Always of the same uniform high quality, they will help you get top-notch performance from every unit and extra hours of trouble-free service.

Call in a Gulf engineer before you start your next job and ask him to recommend the proper types and grades to meet your particular requirements. The services of a Gulf engineer—and the Gulf line of quality lubricants and fuels — are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION · GULF REFINING COMPANY

GULF BUILDING · PITTSBURGH, PA.

OIL IS AMMUNITION . . . USE IT WISELY!

FOR BIGGER PAY-LOAD DIGGING

HAISS HI-POWER

LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT!

Up out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or rope wear . . . in one test, 40% better efficiency than next best bucket.

Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles . . . *Write or wire for prices, delivery and catalog details.*

GEORGE HAISS MFG. CO., INC., 139TH ST. & CANAL PL., NEW YORK

In Any WEATHER ...AnyWHERE, Sterling WHEELBARROWS Work!

For nearly 40 years, Sterling Wheelbarrow performance has proved that Sterlings can always be depended upon to deliver capacity results, regardless of clime or location. *Any* man-power, anywhere, can produce when Sterlings are on the job . . . no experts or trained help required for peak results. Today . . . all over the country, Sterlings are proving indispensable in the nation's efforts to speed production, conserve materials and win the war. Tomorrow . . . after peace has been restored, Sterlings will again be available, in all styles and capacities, to help in the reconstruction work.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

PRODUCTION CONTROL BOARD, called "Produc-Trol", is device which enables production and purchasing executives quickly to see all facts concerning raw materials, parts, assemblies, machine and man

hours. At left of board are listed parts, assemblies, sub-assemblies or individual operations on a part. Movable tapes working from left to right on pulleys bring all pertinent facts into instant focus. Double rows of peg holes under movable tapes and various colored pegs permit many arrangements of comparative data and control required for any operation. May be ordered in sizes to fit specific needs. Models also available for individual or group incentive plans.—**Wassell Organization, Westport, Conn.**

★ ★ ★

NEW PAINT PRODUCT that primes, seals and finishes on any interior surface in one coat has been formulated for maintenance work on industrial, institutional and commercial properties. Designated Valdura Singlekote, it is said to combine hiding power and economy of water-type paints with washability, durability and performance of oil-type coatings. May be applied to surface previously coated with calcimine or casein paints, provided old covering is bonded or tight to wall. Not recommended for use on oily or greasy surfaces. High hiding power permits coverage of dark surfaces with single coat. Product is self-leveling, sets within 2 hr., dries within 12 hr. and provides dead-flat finish when viewed at 90-deg. angle. Interior surfaces that may be covered are: plaster, concrete, brick, wallboard, wood, wallpaper and metal. Coverage is up to 750 sq.ft. per gal. Packed in 1-gal. cans, 5-gal. pails and in drums. Available in white only but may be tinted with alkali resistant colors in oil. In concentrated form, 1 gal. of Valdura Singlekote provides 5 qt. of paint when mixed with 1 qt. of turpentine or mineral spirits.—**American-Marietta Co., 43 E. Ohio St. Chicago.**

★ ★ ★

CONCRETE CURING COMPOUND, called "Tru-Cure," is clear liquid which is sprayed on wet concrete immediately after finishing and which is claimed to seal in moisture, eliminating from several hours' to day's time lost on average concrete job before curing can be started. Said to produce equivalent of 14-day water cure with-

out any labor expense of hauling earth, keeping surfaces wet, applying and removing paper, burlap or cotton mats and making pipe connections. Saves cost of maintaining equipment to handle foregoing jobs and is said to leave areas thoroughly cured without marring beauty or changing color or appearance of work. According to laboratory tests, Tru-Cure has moisture retaining qualities better than 96 percent at 24 hr. at temperature of 110 deg. F. or 90 percent at 7 days.—**The Truscon Laboratories, Detroit, Mich.**

EVERY ROAD LEADS TO VICTORY

● There are no *unimportant* roads in America today! Unless food products move over "secondary" farm-to-market roads with dispatch and unfailing regularity . . . unless raw materials and finished parts get to far-flung processing, fabricating and assembling plants on schedule . . . the vital high-speed timetables of our armed forces and armament builders can't be maintained.

Since war needs make it impossible for you men who must build and maintain America's roads to get much new equipment, it's mighty important to keep available machines in the pink of condition.

This calls for instructions to operators on avoidance of abuse, overloading and excessive speeds. Even ruggedly built A-W machines have endurance limits. And regular inspection and maintenance by men who know exactly what to do, means extra years of effective performance . . . will help you keep irreplaceable equipment operating for the duration.

Your nearby Austin-Western dealer has this experience. He is trained and equipped to do a thorough job with a minimum of lay-up time for the machines. Use his expert service for all major maintenance and repair jobs. He will gladly help you work out a practical system of operator instruction, of inspection, lubrication and adjustment that will prevent many breakdowns . . . help you make good on your vital assignment of keeping 'em rolling on the home front.

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

Four flat bearing surfaces give the Laughlin Safety Clip a four-square *Fist-Grip* on wire rope. No finger-pinching U-Bolt to bite and bend the strands, weakening them under high tension and whipping.

95% of Rope Strength delivered with the Fist-Grip Safety Clip is proved by competitive tests, three Safety Clips holding when the rope snaps under four U-Bolt Clips. Fewer clips mean savings in time and money. And inexperienced help can't put them on backwards — the saddles are identical.

25% STEEL SAVED FOR WAR NEEDS—

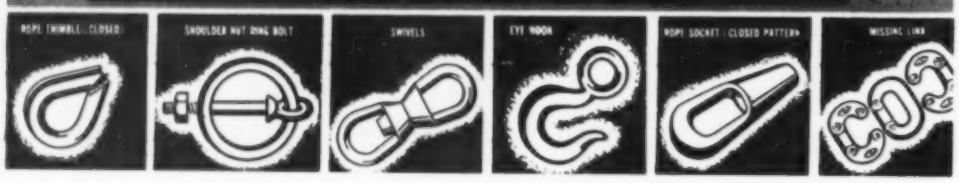
For an assembly of equal strength, Safety Clips use 25% less steel than a U-Bolt assembly. You are saving precious steel available for ships, tanks and guns when you use Safety Clips. Remember — they don't crimp and crush wire rope — no expensive waste from cut-off rope ends.

These Safety Savings Can Be Yours

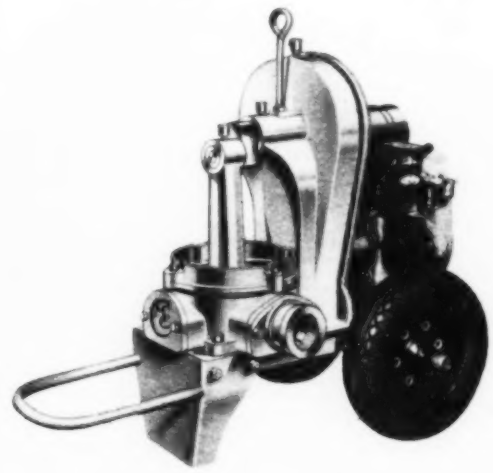
No rope crimping — rope saved
Can't go on backward — accidents saved
Bolts on opposite sides — tightening time saved
No battered, bent threads — clips saved
No special wrench — tools saved
Fewer clips needed — clips saved
Fewer rope breaks — accidents saved

Distributed Exclusively Through Mill Supply Houses
Look for Laughlin Products in *Metal & Non Metallic Mining Catalog*

THE THOMAS LAUGHLIN COMPANY
PORTLAND, MAINE



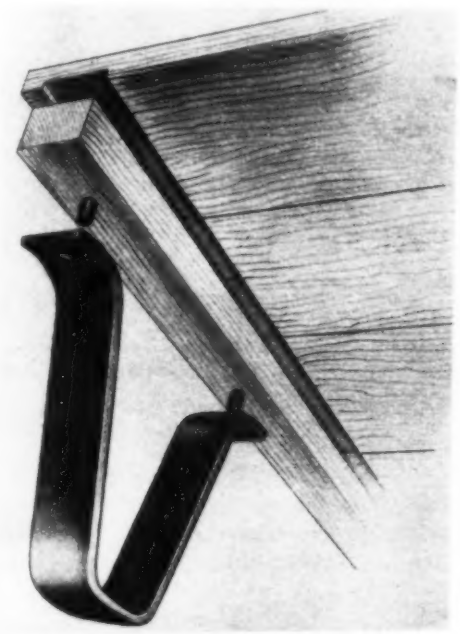
IMPROVED DIAPHRAGM PUMP may be had in two sizes: (1) 3-in. model, 3,000 gph. at 10-ft. suction lift and 1,500 gph. at 20-ft. suction lift, powered by 2½ hp. engine; (2) 4-in.model, 6,000 gph. at 10-ft.



suction lift and 3,000 gph. at 20-ft. suction lift, powered by 3½-hp. engine. Features; Timken bearing construction; full finished roller chain drive (every link roller bearing); cut tooth sprockets completely inclosed; improved type, "basket weave" diaphragm; interuseable suction; discharge and cleanout locations. — **Construction Machinery Co., Waterloo, Iowa.**

★ ★ ★

WOOD SKID-PLATFORM, called Timber-Lock, designed to conserve steel, has none of this essential war material in frame and yet is said to provide all strength inherent in steel product. Made of especially selected tough oak by new interlocking "woodweld" process, developed to tie supporting leg runners and deck boards into one inseparable unit. Instead of placing and nailing platform deck on to supporting leg runners, deep cut grooves are run entire length of deck boards



and into each groove, supporting leg beam is tightly fitted, thus interlocking platform and beams in viselike grip and, according to makers, completely eliminating rocking and shaking. Further to insure this one-piece rigidity, beam and deck are bound together wth cement coated, spiralled helical nails, placed in two rows alternately spaced 1 in. apart along entire platform length. Legs are steel bars joined to leg beams by heavy forged steel bolts, which have washers on top and bottom to guarantee rigid clamp. Large diameter steel washer under leg bolt is said to provide wide bearing point and to insure increased leg stability. Timber-Lock is available in all standard widths and lengths with plain or armored ends and in four- or six-leg construction. **—The Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.**

DON'T LET THE CLOCK OR THE THERMOMETER CONTROL *Your* CONCRETING SCHEDULES

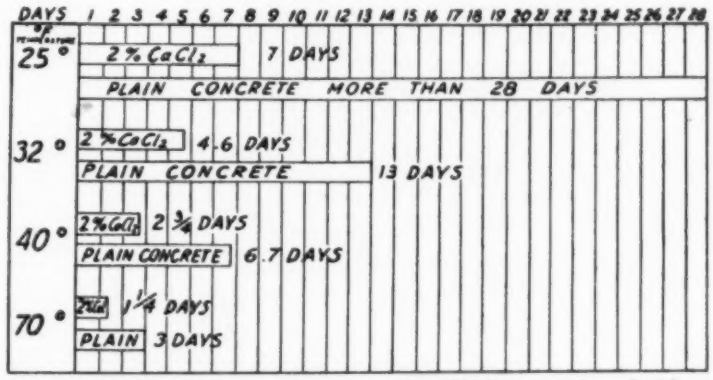
WHEN *You* CAN CONTROL THEM WITH CALCIUM CHLORIDE

Right now, during the fall months, is the time when concrete construction is particularly tricky. Noon-time temperatures of 60° or above can quickly drop to 50° or less before mid-afternoon. Then concreting slows down or stops for the day—unless means have been taken to compensate for the dropping thermometer.

Just a small quantity of calcium chloride (2 lbs. to the sack of cement) puts concrete in a position to ignore temperature changes and forget the time of day. Pouring of concrete can continue to within an hour of closing time, since the rapid hardening action permits finishing to closely follow placing. Schedules can be stepped up, labor saved, and actual reductions in cost effected.

Research at the National Bureau of Standards shows that plain concrete which acquires safe strength in 3 days at 70 degrees will acquire the same strength in less than 3 days at *40 degrees* when 2% calcium chloride is added. Thus calcium chloride more than compensates for the drop from 70° to 40°. And the differences in strength between concrete with and without calcium chloride are even more marked at temperatures of 32, 25, or even 20 degrees.

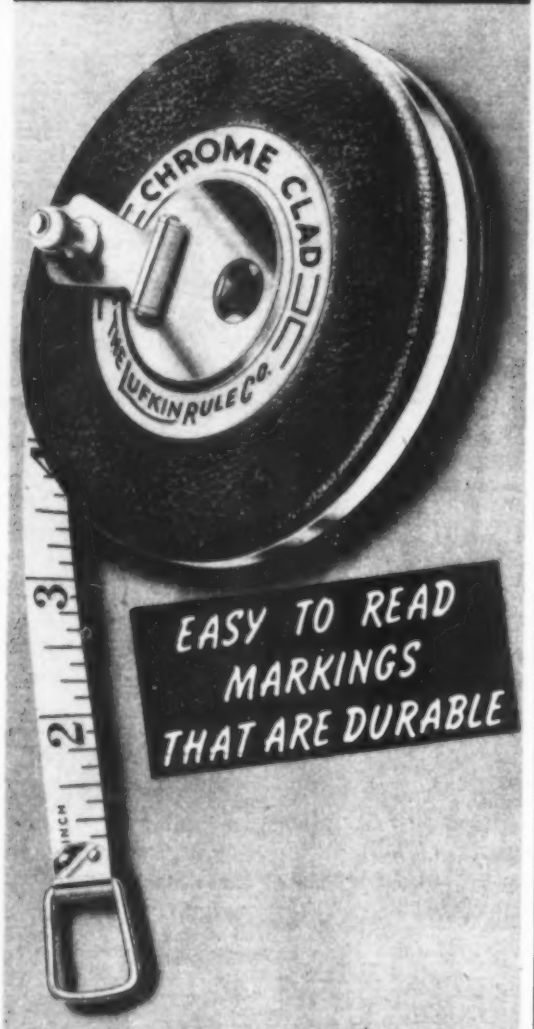
Bulletin No. 28, titled "Early Strength Concrete," gives all the data from Bureau of Standards reports, and includes numerous examples of field experience on large and small jobs. Every man who places concrete should have this important manual. Write for it today.



Days required for 1:2:4 concrete mix to attain 2000 p.s.i. with and without calcium chloride at various temperatures without cover or protection.

CALCIUM CHLORIDE ASSOCIATION, 4145 Penobscot Bldg., Detroit

"LEADER"—
CHROME CLAD STEEL TAPES FOR *busy* CONTRACTORS



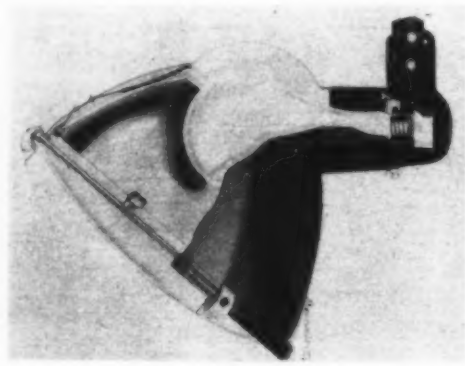
Tired of trying to use a hard-to-read, old fashioned steel tape? Then now's the time to get a new Lufkin "Leader"—the tape with the Chrome Clad line that contractors everywhere are praising. Jet black markings show up prominently against a satin-chrome surface that won't rust, crack, chip or peel. The "Leader" will be your most useful tool. Order it from your dealer today. Write for free Catalog.

LUFKIN

SAGINAW, MICHIGAN • New York City

TAPES · RULES · PRECISION TOOLS

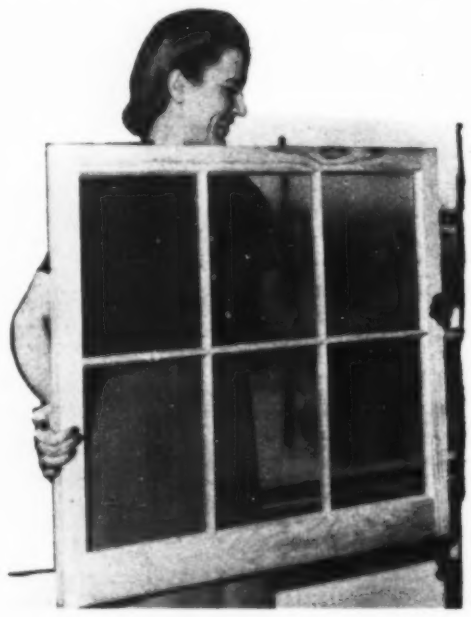
WIDE AND NARROW BEAM FLOODLIGHTS, designed especially for lighting shipyards, construction projects, industrial yards and sports areas, are equipped with snap covers having heat resisting glass lenses making them dust-tight and moisture-proof to prevent accumula-



tions of dust and grime on reflecting surface. Choice of narrow beam glass reflector or wide beam porcelain enamel reflector with various lenses and lamp combinations (750 to 1,500 watts) provides complete range of beam spreads. Reflector housing formed from annealed sheet iron with green porcelain enamel finish. Wide beam unit (VE-18) has white porcelain enamel inside surface.—**Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio.**

★ ★ ★

NEW TYPE WINDOW PANE of transparent plastic laminated with wire mesh claimed to withstand explosion of 150-lb. bomb 8 ft. distant has been developed for use on military construction and industrial plants in potential air raid zones. Tested under vacuum shock conditions, it is said to have stood up under 28-in. vacuum, while clear glass shattered at 15 in. and heavy, wire-reinforced glass at 26 in. At Navy's Bureau of Yards and Docks ¼-lb. ball dropped from height of 20



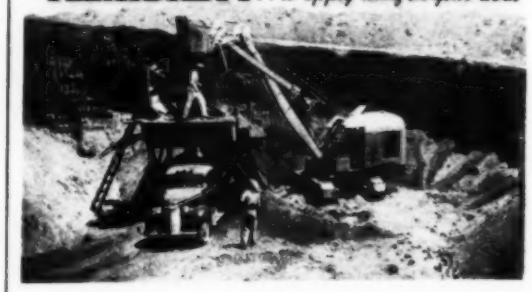
in. smashed ordinary glass, while it required 2-lb. ball from height of 42 in. to penetrate pane of reinforced plastic. Even then, it is claimed, missile left clean-cut hole which could be repaired with cellulose tape with little loss in breakage resistance over solid pane. New material consists of standard 16-mesh wire screening sandwiched between two sheets of Vuelite, transparent cellulose acetate sheeting originally developed for fluorescent lighting fixtures. Sheets of laminated plastic may be drawn or formed to almost any desired shape. For economy in manufacture, however, panels of eight standard sizes are recommended, ranging from 9½ in. square to 19½x24½ in. Standard panels are drawn with ¼-in. flange which can be easily and quickly fastened to wood sash with automatic stapler, then puttied to form weather-tight permanent installation.—**Plastics Division, Monsanto Chemical Co., Springfield, Mass.**

POWER.. *to lip on its toes*

SPEED.. *to keep truckers bumping*

STRENGTH.. *to finish whatever it starts*

FLEXIBILITY.. *to apply itself on your work*



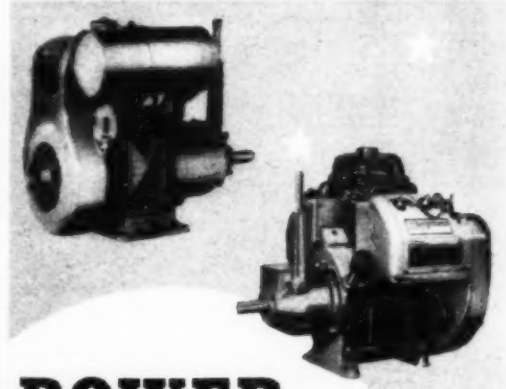
You need these four requirements in every power shovel or crane you operate if maximum steady performance is expected. Together they spell O-U-T-P-U-T . . . and output is the chief requirement to speed up construction now. Byers representatives carry job performance reports they will gladly show you upon your inquiry. Ask about them for your own information.

This is another reason why you should investigate Byers ⅜ to ¾ yd. shovels and cranes

Modern CRANES and SHOVELS

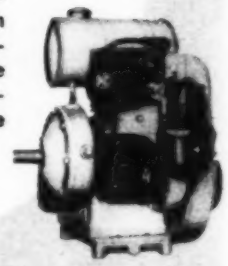
BYERS

RAVENNA, OHIO



POWER to *WIN!*

● In terms of man-hours saved, and productive capacity of machines increased . . . Wisconsin heavy-duty air-cooled engines are supplying the United Nations and Industry-at-Large with the Power to Win!



A complete range of sizes, from 1 to 35 hp., 1 and 4-cylinder models. Specified as standard power equipment by more than 300 manufacturers.

WISCONSIN MOTOR Corporation

MILWAUKEE WISCONSIN U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

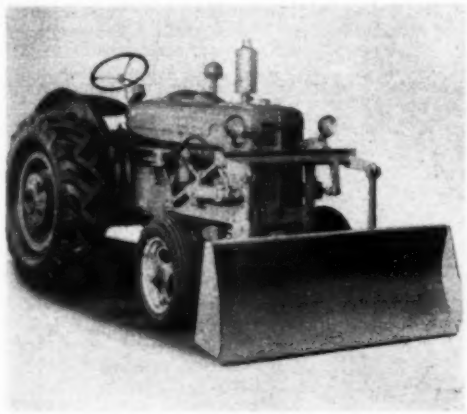
NAIL EXPANSION BOLTS are claimed to attach heavy machines, chairs, conduit, boxes, wall brackets, cable-clamps, awnings, bathroom fixtures, radiators, signs, porcelain knobs or any other type of fixture to masonry in seconds instead of minutes, eliminating screw expansion

anchors. Head of bolt not only holds fixture, but slotted portion anchors it in masonry. Nail is driven down through center of bolt, wedging lower slotted portion apart against sidewalls of hole in masonry, and locking it against vibration. Maker says bolts cannot fracture face of

material as expansion takes place at bottom of hole. To install: drill hole in masonry, pass bolt through hole in fixture and into hole in masonry; then drive nail into bolt. To remove: withdraw nail — head of bolt holds fixture as nail is used only to expand bolt. Available in variety of sizes to cover field of usefulness, measured by diameter and length of bolt under head, not nail.— **Brush Nail Expansion Bolt Co., Greenwich, Conn.**

★ ★ ★

HYDRAULICALLY CONTROLLED BULLDOZER, developed for use on light wheeled tractors, is being used extensively for finish-up work around camps and airports, according to its makers. It does same type of work as standard model, levels, grades, backfills, spreads refuse and materials, excavates and removes snow. Pow-



ered by rear-power-takeoff hydraulic pump unit. Blade, lifted and lowered by dual cylinders, makes cut 6 in. deep. Moldboard, 24 in. wide and 66 fn. long can be raised 12½ in. Adaptable for use in mines for mucking and conveyor feeding and in open pit mines and quarries for clean-up and shovel-feeding. Uses in general industry: camp building, handling foundry sand, spreading waste products in fills, building roads and parking areas, removing snow and loading or stockpiling fuel, cinders and other loose material. — **Baker Manufacturing Co., 501 Stanford Ave., Springfield, Ill.**

URGENT speed of wartime production gave the verdict — *settled, once and for all,* the supremacy of Blackhawk's newest developments in socket wrenches over big-jawed "adjustables" and out-of-date "open-enders." And because of their greater speed and efficiency, Blackhawk SOCKET WRENCHES hit new "highs" in preference and use on assembly and production lines turning out planes, jeeps, tanks, motorcycles and other mechanized war machines.

More Than 23,000 Combinations With One 50-Piece Set of Blackhawk Socket Wrenches!

Here's why! All sockets, attachments and handles click together instantly into one solid tool — each combination selected for just the right leverage and clearance to handle any job FAST. No wonder they "knocked out" clumsy, misfit, old-fashioned wrenches — put an end to short bites, rounded off nuts, slip-offs and barked knuckles! Blackhawk sockets *really fit* — "take hold" on all six sides of a hex nut, instead of only two.

For lightweight, tough, fast-working wrenches with openings of 3/16" to 3½" — for complete details on "LOCK-ON" and other exclusive Blackhawk features—WRITE TODAY for 48-page "HANDY GUIDE." It describes Blackhawk's complete line-up of 185 sockets, handles, attachments, ratchet adaptors, box wrenches, torque indicators and specialties.

A Product of
BLACKHAWK MFG. COMPANY
Department W2392 Milwaukee, Wisconsin

High mobility — on the road between jobs, and in moving about on the job site — is just one of the basic features which have made Le Roi Compressors so popular in the construction industry. Truck-type springs, cushioned towing eye protect against road shocks. Built by the *only* manufacturer who makes *both* engine and compressor. Le Roi-powered with heavy-duty valve-in-head engine—easily accessible for adjustment and quick, less costly repairs. Le Roi Compressors help you to make good with on-time performance on emergency construction . . . Write for information describing models available under present restrictions.

LE ROI COMPANY
MILWAUKEE • WISCONSIN
C-12

ELECTRIC TRACTOR, claimed to provide maximum of traction, safety and flexible operation, is two-engine, four-wheel-drive unit with drawbar pull, 800 lb. normal, 3,600 lb. ultimate. Features include four-wheel, extra large external contracting brakes, mounted on worm shaft, pro-

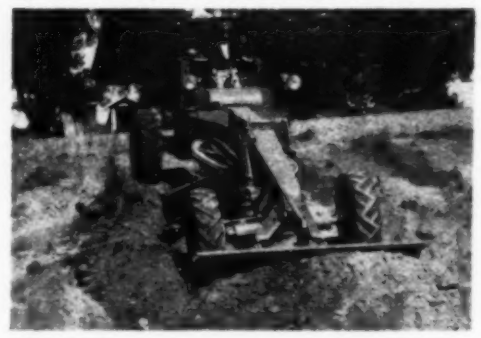
viding equal braking on all wheels. Frame is of extra heavy construction from standard plates and shapes, hot riveted and welded into rigid and mono-unit construction. Travel is controlled by lever-operated, drum-type controller, interlocked automatically with operator's seat and brake foot pedal. If controller is left in any speed position, handle must be brought to neutral, with brake released and operator seated before power can be applied. Battery compartment will be provided for either side or top removal of battery.—**Crescent Truck Co., Lebanon, Pa.**

★ ★ ★

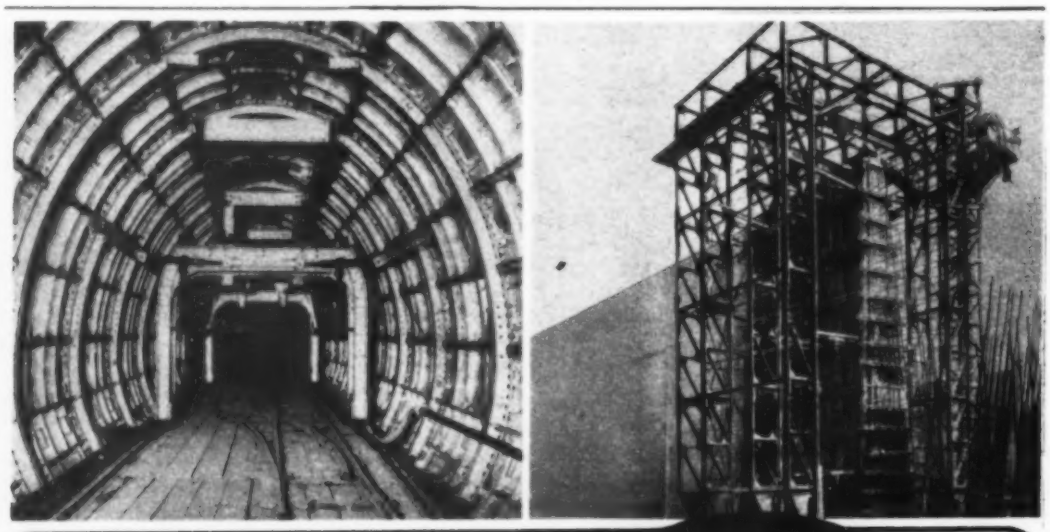
SPECIAL PAINT SYSTEM, known as "Pre-Fab," for use on pre-fabricated housing units consists of rapid drying shop coat which can be used without preliminary sealer on plywood, ordinary lumber or manufactured board and quality lead, zinc and oil field coat. Material used for shop coat provides superior surface for finish coat and does not deteriorate if unfavorable weather conditions or scarcity of labor causes delay in application of finish coat at building site. Weathering tests in which houses painted with shop coat only were exposed to elements for extended periods showed no noticeable change in surface condition, according to testing engineers.—**The Airco Co., Cleveland, Ohio.**

★ ★ ★

BULLDOZER, attached to "99-M" power grader, may be used with good results, according to manufacturer, for moving excess or excavated material on grading, construction and heavy road maintenance without tying up extra manpower and equipment. Extra power in front wheels (directly behind bulldozer moldboard) and all-around steer said to make effective hookup. All vertical adjustments made with small,



effortless lever at dash which controls hydraulic ram mechanism. May be attached or removed quickly and in raised position will not interfere with regular grader work. Formed steel plate moldboard is reinforced by six vertical steel ribs welded in position; cutting bit of high carbon steel is bolted to bottom edge. Moldboard is supported by rugged push frame that hinges on heavy mounting bracket bolted to grader frame, relieving axle and steering mechanism of strain. Width of blade, 9 ft.; height with bit, 3 ft. 3 in.; thickness, 5/16 in. Lift above grade, 14 in.; cut below grade, 6 in.—**The Austin-Western Road Machinery Co., Aurora, Ill.**



for Economy in Construction

BLAW-KNOX STEEL FORM Engineers offer a consultation service before plans are drawn, with the thought in mind that their specialized knowledge and experience may be of assistance to both engineers and contractors in promoting speed and economy in construction, and securing a superior quality of finished work.

This engineering service is yours for the asking.

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EXTRA OUTPUT from Rock Drills is dependent on both drilling speed of the machines and their ease of operation. Thor Drills, with the patented Short Travel Tubular Valve, drill faster on any kind of going. They are faster in action, too, because the Thor four position throttle gives the operator complete control of drilling speed for all operations from hole starting to full power.

CAN'T AFFORD DELAYS

Besides faster performance, you need dependable performance. Thor Rock Drills give you this, too, because they are built of drop forged steel for "round the clock" service. Typical of hundreds of Thor users, the Appalachian Marble Co. quarry of Knoxville, Tenn. reports, "Our Thor #75 Rock Drill has been in use every day for a year . . . and not one cent has been spent for repairs!"

MAINTAIN YOUR SCHEDULE

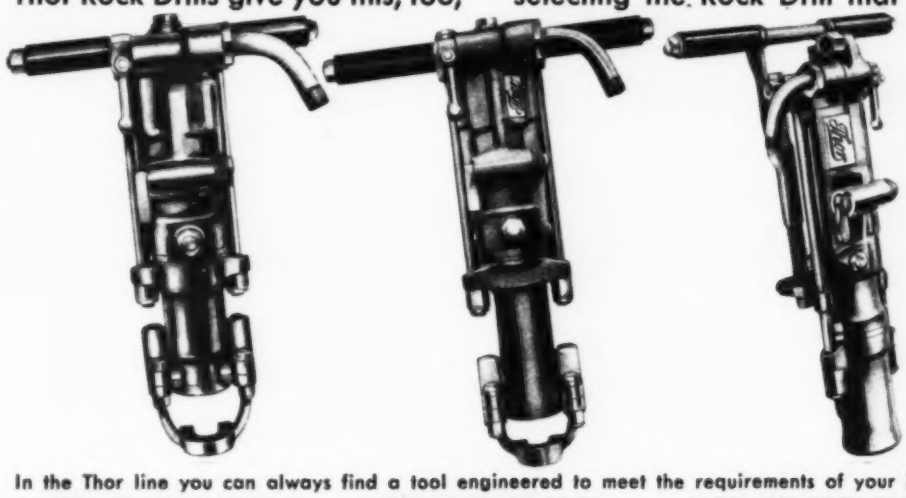
Be sure your Rock Drills give you not only high output but also protection against break downs and job delays. Your Thor distributor can give you expert advice on selecting the Rock Drill that can give best performance and longest service for your particular type of work. Feel free to call on him at any time.

INDEPENDENT PNEUMATIC TOOL CO.

600 West Jackson Boulevard, Chicago, Illinois

FREE TOOL GUIDE!

Describes each type of Thor Contractors Tool in detail, tells the type of service it is designed for, and the nature of the work it is to be used on. Gives tips on tool selection and application that will help you get the right tools for your job to save time and money. Write for your free copy.



In the Thor line you can always find a tool engineered to meet the requirements of your job.

THOR #38 ROCK DRILL
Sturdy, light weight Sinker for drilling holes up to 12 feet in depth. Most suitable for soft and medium rock.

THOR #70 SERIES ROCK DRILLS
Four medium weight, general purpose Sinkers for hard, deep hole drilling.

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Rugged, heavy weight machine for deep down drilling in the hardest rock formations.

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Thor

PAVING BREAKERS - CLAY DIGGERS - SUMP PUMPS
BACKFILL TAMPERS - SAWS
HAMMERS

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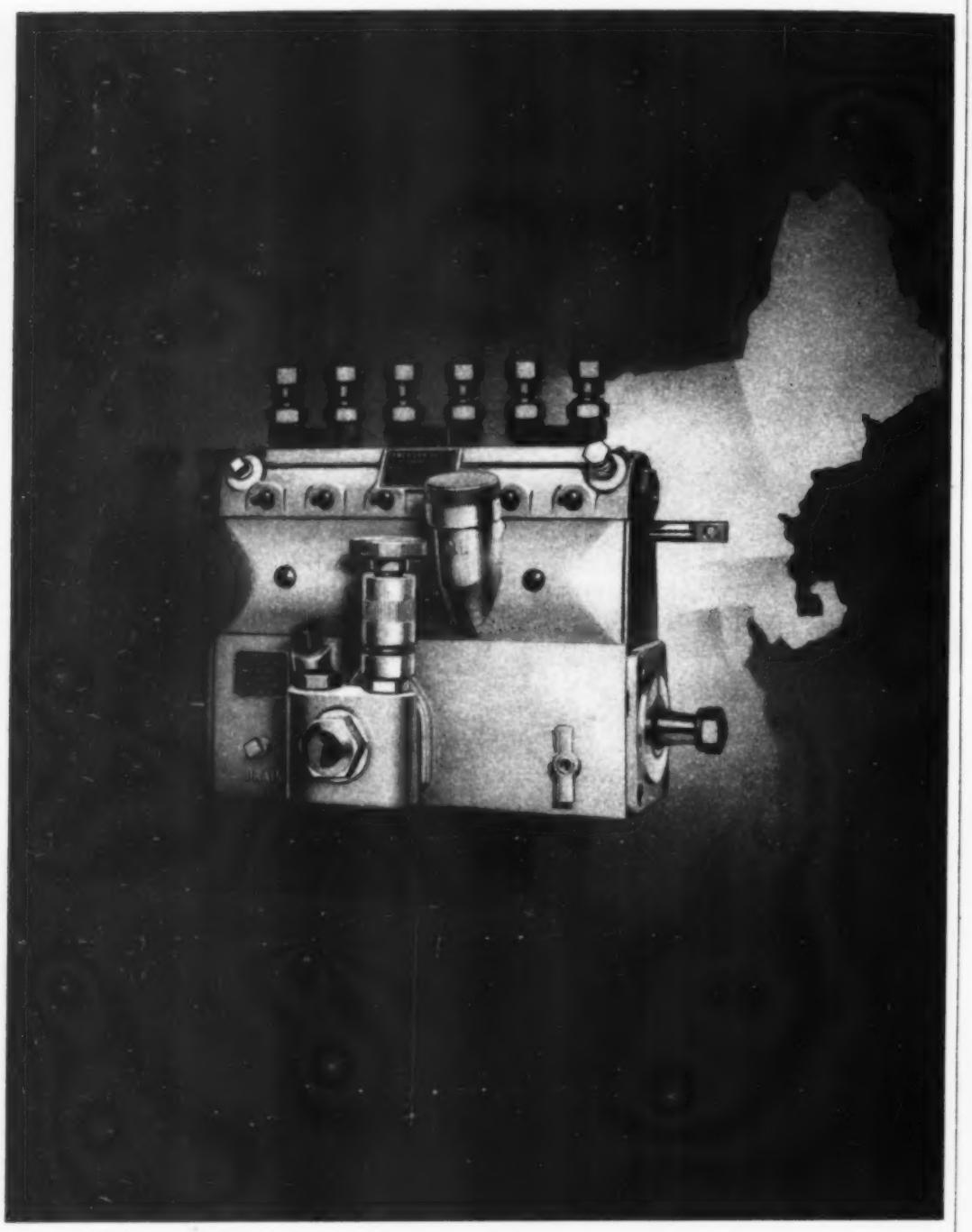
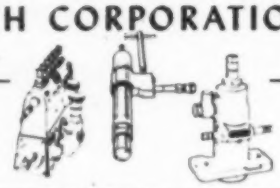


AMERICAN BOSCH
DIESEL INJECTION EQUIPMENT

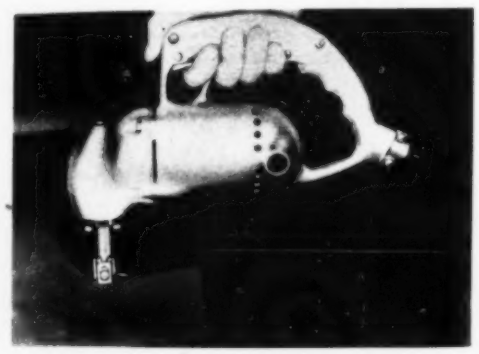
AMERICAN BOSCH CORPORATION SPRINGFIELD, MASS.
BRANCHES: NEW YORK, CLEVELAND, DETROIT, CHICAGO, SAN FRANCISCO



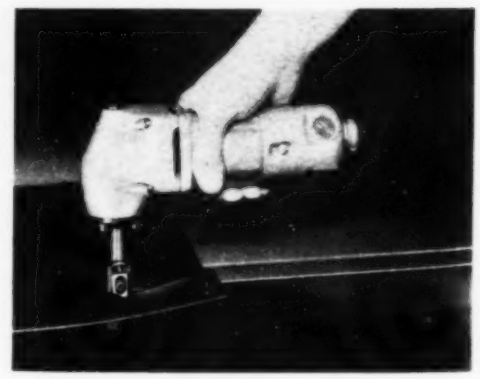
TWENTY HIGH-DUMP TRUCK MIXERS, 5 cu-yd capacity, mounted on Euclid Model 14Fd chassis and powered by 150-hp. Cummins diesel engines have been completed recently by U.S. engineers. These units will be used for building of military roads, airports and other construction requiring off-the-highway transportation of materials. By removing mixer unit and making minor structural changes, chassis can be converted into standard Euclid rear-dump truck for hauling of earth, rock and other construction materials.—**The Euclid Road Machinery Co., Cleveland, Ohio.**

★ ★ ★

ELECTRIC SHEARS, trade name "Lectro-Shear" in 16- and 18-gage models, have been redesigned by their manufacturers to improve ease of handling and operating characteristics. No. 18 has been reduced in outer dimensions so that motor housing forms comfortable operating handle, weight and length of tool are greatly lessened and operating balance and control improved. Power and capacity of models are same as in previous models, cutting up to 18-gage sheet steel. Larger No. 16 model has been equipped with improved operating handle which provides better balance and easier control on curved and irregular lines. Equipped with instant release trigger switch, with locking pin for continuous operation. Handle is so shaped that it can be used over tool or at rear end. As in previous model, this tool cuts up to No. 16 gage sheet steel.—**Black & Decker Mfg. Co., Towson, Md.**



MODEL NO. 16 cuts up to 16-gage sheet steel.



MODEL NO. 18 cuts up to 18-gage sheet metal.

KAISER COMPANY, Inc. PORTLAND, OREGON

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Building for VICTORY

LIMA *in* Ship Building

Ships and more ships are needed to carry our ever increasing output of war material to our allies in all parts of the world if we are to have an early victory. Unhindered by shipbuilding precedent, Kaiser Company, Inc., Portland, Oregon is pioneering in all-weld, pre-assembled mass production of victory ships. This type of construction calls for full utilization of fast, mobile lifting cranes. It is here that Lima enters the picture. Kaiser Company, Inc. are the owners of several LIMA cranes, many having lifting capacities of 65 tons. LIMA cranes, with independent clutches, are fast and safe for hoisting, swinging, traveling, and booming up or down simultaneously. Equipped with big, wide drums they are easy on cable and will accomodate maximum cable lengths. Anti-friction bearings are used at every important bearing point for smooth, fast, efficient operation. Many other features important to fast, successful crane operations are included in LIMA'S design.

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Shovel and Crane Division - - - LIMA, OHIO

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SHOVELS, ¾ YD. TO 3½ YD. CRANES, 13 TONS TO 65 TONS
DRAGLINES, VARIABLE

TWISTYES

PATENTED

A combination Tie and Spreader used on National Defense Projects from Coast to Coast.

FEATURES:

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ASSURES ACCURATE WALL WIDTHS
BROKEN-OFF BACK OF THE WALL FACE REMOVED WITHOUT STRIPPING FORMS

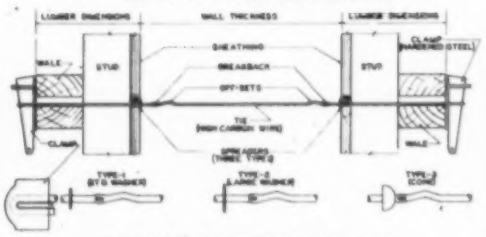
THE CLAMP

AMPLE TAKE-UP — OVERCOMES IRREGULARITY IN LUMBER SIZES

LARGE BEARINGS AREA — WILL NOT "BITE" THE WALE UNDER MAXIMUM LOAD

• ● •

TO HELP SPEED UP OUR NATIONAL DEFENSE PROGRAM STOCKS ARE CARRIED AT ALL BRANCHES



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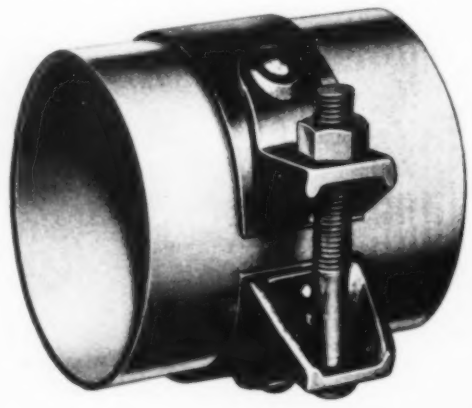
CHICAGO, ILL.

BRANCHES: NEW YORK — ATLANTA — HOUSTON — CLEVELAND HEIGHTS

If it's a Form or a Form Tie —
We can make it

Send for our Catalogue

BAND CLAMP, style 77A, for quick repair of small pin holes, leaks and splits in straight runs of pipe, is claimed to be simply constructed, fast and easy to apply and to prevent further loss of line contents where small defects occur. Consists of heavy, one-piece steel band of circular, split construction with riveted bolt lug at each end.



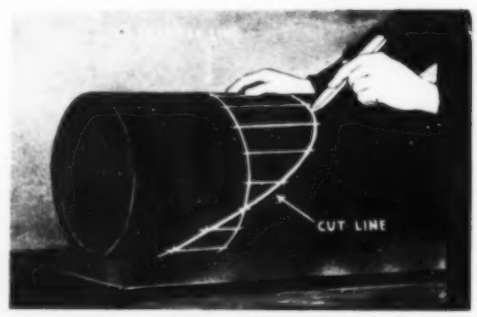
Track head bolt pulls ends securely. To install, clamp is sprung apart until it can be slipped around pipe and over gasket or packing. Then it is bolted up to make firm leak-proof repair. Special cone gasket (furnished when specified) has two molded rubber tabs which aid in positioning gasket over pin hole or leak. Sizes include standard range from 1 in. I.D. to 26 in. O.D. Also cast-iron pipe and special sizes. Band widths of 2-, 3-, 4- and 6 in. and band thicknesses of 1/16, 3/32 and 1/8 in. are available. — **Dresser Manufacturing Co., Bradford, Pa.**

★ ★ ★

FOR PREVENTING SPLITTING AND CHECKING OF LUMBER during necessary seasoning or drying process and also for treating wood so that it may be bent and shaped for specific war uses, seasoning with synthetic chemical, known as Urea is proving of great value to lumber companies in supplying products for Army and Navy needs. The Navy is using thousands of feet of treated lumber for decks, ribs, frames and other structural parts of ships. Auxiliary stocks of treated lumber are being carried on board Navy vessels for emergency repairs of ships themselves and for building and repairing docks, landings and other facilities. The Army is purchasing treated lumber in clear and structural grades for stringers, planks and rails on Army pontoons used for bridges. Without using Urea, chemists claim that it would have been impossible for industry to dry enough lumber to supply government needs. This chemical is used in making formaldehyde resins and adhesives and in textile treatment.—**E. I. du Pont de Nemours & Co., Wilmington, Del.**

★ ★ ★

ANGLE METER enables man on job to make pipe bands up to 126 deg. and "Y" layouts. Features: (1) Extends range of angles and bends up to 126 deg. (instead of 90 deg.) (2) permits laying out of bends and "Y"s directly on pipe and sheet metal—also multi-piece bends; (3) requires



no calculations, saving time and material; (4) available flat for shop use or folded for field use. Folded type has reinforced folds for durability. Pointer is of Vinylite to insure accuracy. Overall size of Angle Meter in 12x12 in., printed in three colors and varnished. Shipping weight, folded type, 10 oz.; flat type 14 oz. Complete instructions and useful data supplied with each unit.—**Interstate Sales Co., 1123 Broadway, New York City.**

Think of the many advantages of SMITH AIR COMPRESSORS

and you'll use them for a majority of your compressor work

Consider these important features! 1. Low initial cost and maintenance. (Model 100 illustrated below uses only one gal. of gasoline an hour.) 2. Repairs and parts available at Ford garages everywhere. 3. Light weight, easy to handle: Tow it at permissable truck speeds. 4. Capacity easily varied for different jobs. 5. Its ruggedness and efficiency are sources of constant satisfaction to users. 6. Automatic unloading and idling; self-starter. 7. No couplings, belt, clutch or gears to give trouble. 8. Made with FORD motors and standard parts.

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Construction Estimates and Costs

653 pp., 6 x 9, many diagrams and tables, $5.00

Takes up each step of construction work separately — from first investigation to final, detailed estimates — and provides simple, arithmetical methods of accurately estimating costs. Covers estimating with both tables and diagrams and includes specimen tables and diagrams. Both diagrams and tables show variations in quantities as well as in prices of material and labor. Worked-out estimates for typical jobs show application of methods.

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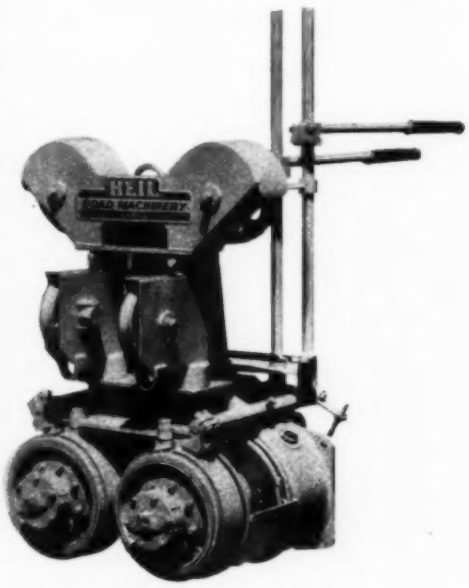
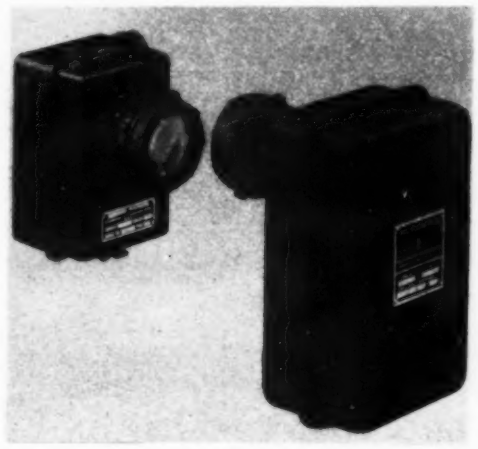
DOUBLE-DRUM POWER CONTROL UNIT for use with all makes of tractors from 50 to 150 hp., is all-purpose unit providing two-line cable control for operation of twin cable scoops or of two single cable units such as bulldozer-ripper combination. Features: (1) Heavy-duty, forged alloy steel main drive and reduction gears, with gears



and bearings completely incased in all-welded gear case; (2) garter-type oil seals effectively seal gear case against oil leakage and dust infiltration; (3) clutches are bevel cone-shaped and fitted with molded linings; (4) adjustments are quickly made without disturbing any other parts of unit; (5) brakes are positive, self-energizing and automatically hold load when operating levers are released; (6) gears, bearings, shafts, housing and superstructure were all designed and tested to withstand line pull of 8,000 lb. on bare drum with ample safety factor; (7) finger-tip control. Rear power takeoff adapters provided to attach unit to all current models of tractors.—**The Heil Co., 3000 W. Montana St., Milwaukee, Wis.**

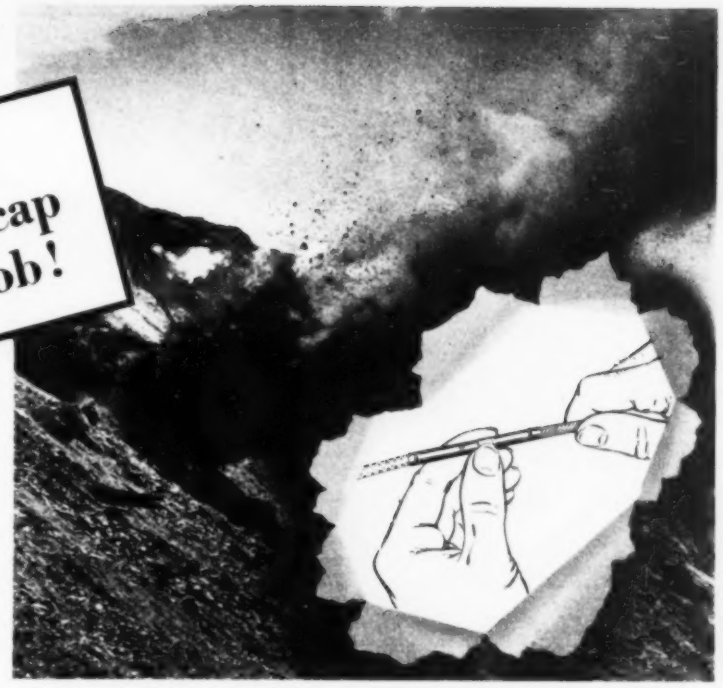
★ ★ ★

PHOTO-ELECTRIC BURGLAR ALARM CONTROL, for protection against intruders and saboteurs, has light source which projects practically invisible light beam for distances of 350 to 700 ft., making it possible completely to surround power plants, defense factories and other vital areas. If light beam is broken by intruders or saboteurs, photo-electric control contacts close, sounding



alarms, operating central station system, turning on flood lights and closing gates. Control is provided with latching unit including push-button station which may be located in gate house, office or other convenient point, and alarm may be latched in operation once light beam has been broken until reset button is operated. Photoswitch is unaffected by changes in local light and is designed to operate 24 hr. a day. Relay contacts are pure silver and will handle 15 amp. a.c. and 8 amp. d.c. Control operates from 115 v., a.c., source of supply.—**Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass.**

Here's the only cap on the job!



When Primacord is the detonating agent, a single cap is the *only one* needed to set off an entire series of holes! It is attached after everything is ready — connections checked, equipment moved and men in a safe place.

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STANDARD SIZES				SPECIAL SIZES AVAILABLE	
9	10	11¼	12	13½	Inside Diam.
64	78.54	100	113.1	144	Square Inches

Scientifically constructed laminated fibre tube designed for concrete pier forms up to 10 ft. Easily cut to lengths on job. Requires minimum bracing. Widely used on cantonment and other government construction.

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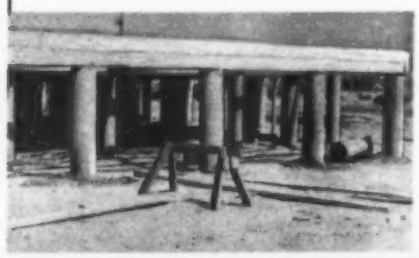

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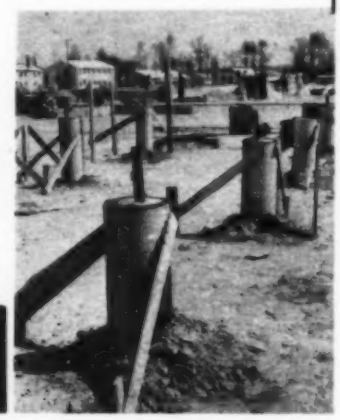

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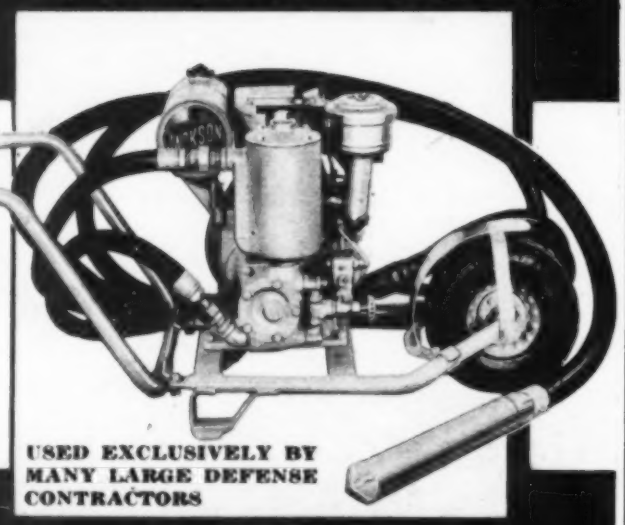
DESIGNED TO "TAKE IT" 3 SHIFTS A DAY — EVERY DAY

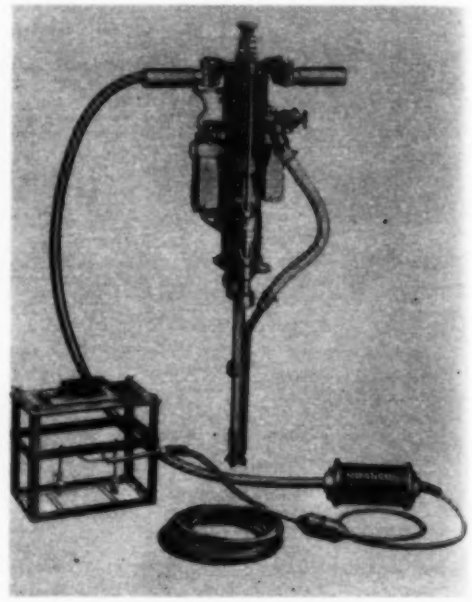
Automatic pressure lubrication—requires no attention.
34-ft. hose—2¾" vibrator head.
Adjustable frequency to 6800 R.P.M.—submerged in concrete. Powerful gas engine—4.7 H.P.
Long lived, ball-bearing, rotary, hydraulic pump.
(Used exclusively by many large defense contractors).



USED EXCLUSIVELY BY MANY LARGE DEFENSE CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

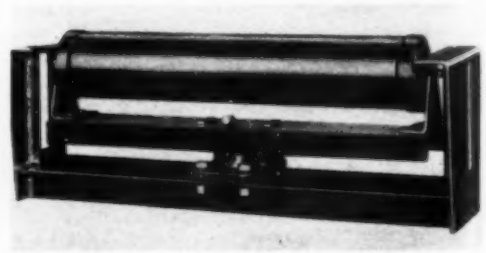
GASOLINE DRILLER, designed especially for rock drilling, is recommended for shallow drilling from surface to depth not exceeding 3 ft. and is said to be particularly adaptable to work where cost of operation and cost or difficulty of moving equipment are determining factors. Driller is rotated by hand, but built-in rotating ratchet makes possible use of standard detachable bits and 1-in. drill rods. Driller is rotated back and forth by operator about 45 deg. each way, and drill rod is turned in one direction while ratchet slips in other direction. Exhaust from driller is used to



clean cuttings from drill holes by exhaust blower, consisting of adapter with flexible steel hose attached to exhaust opening of hammer and blower tube attached to side of drill steel, two sections connected by coupling. Blower tube of proper length is attached to each length of drill rod and is not removed from rod except for repairs. If hollow drill rods are used, it is necessary to plug both ends of rod securely with wooden plugs to prevent cuttings from being blown into rotating mechanism. Drill rods should be supplied 6 in. longer under collar than depth of hole to be drilled, extra length being necessary to provide space for tool retainer and upper connection of exhaust blower tube. Special tool retainer is available when driller is to be used occasionally for breaking in order to keep chisel or moil point from turning. This is of particular interest to utility companies in post-hole digging operations.—**Barco Manufacturing Co., 1801 Winnemac Ave., Chicago, Ill.**

★ ★ ★

SELF-ALIGNING IDLER for flat conveyor belts both return and carrying, is offered to help keep belt centered on supporting idlers. Operation claimed to be sensitive and instantaneous. If conveyor belt runs to one side, idler swivels in horizontal plane, and if belt does not throw back immediately, it eventually contacts counter-



weighted end disk which is slightly larger in diameter than idler roll. Contact with counterweight produces counterforce on idler causing it to swivel rapidly, throwing idler more out of line and forcing belt to swing back. Idler is claimed to be sturdily built unit with no side guide rolls to wear belt edge. Where excessive misalignment of conveyor belt exists, self-aligning idlers spaced at intervals between stationary idlers will automatically bring belt back to central position and avoid possibility of serious injury to conveyor belt.—**Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.**

GOOD SHOOTING, JOHNNIE!

Johnnie used to be a Moretrench welder — fighting on the home front. Now he's in the first line.

Hello Boss

How did the pictures come out that you took? If they don't look nice send them to Japan so we can scare hell out of the Japs.

The Moretrench is well represented here in Norfolk. Your equipment is on most all construction jobs and it makes me feel good to see it. When we're marching and we walk by a pump I tell all the fellows, 'That's the pump they make where I worked last'.

I was over to the rifle range this afternoon getting a little target practice, and we all had ten shots apiece. The target is 200 yards away and my first shot was a bull's eye. I got three altogether and the other shots were close too. It was the first time I shot a gun in my life so I did pretty good.

We're leaving for California in the morning, and it won't be long before we're over there after some Japs ears.

Well Boss I've said enough now for the first time so I'll close until I get more news.

Yours,

Johnnie

Sewer trench excavated in the dry.

Before Johnnie and his mates could train, a naval base had to be built.

Moretrench Wellpoint Equipment was on the job — pumping it DRY — *making a free, fast start a certainty!*

GOOD LUCK, JOHNNIE — WE'LL BOTH KEEP ON DOING THE BEST WE CAN FOR UNCLE SAM!

MORETRENCH CORPORATION

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Our Government is calling upon all truck owners and drivers to join the U. S. Truck Conservation Corps. It's the patriotic thing to do. It's the businesslike thing to do. For, by signing and keeping this pledge, operators will be giving their country the most they can get out of their trucks . . . and will assure themselves of better performance, dependability and operating economy.

General Motors Truck dealers are unusually well equipped to help you keep your Conservation pledge. Their "Victory Maintenance" program was specially developed for war-time service needs. And their preventive maintenance methods . . . pioneered by GMC in 1928 . . . have been practiced and proved by hundreds of truck owners who know this service pays dividends.

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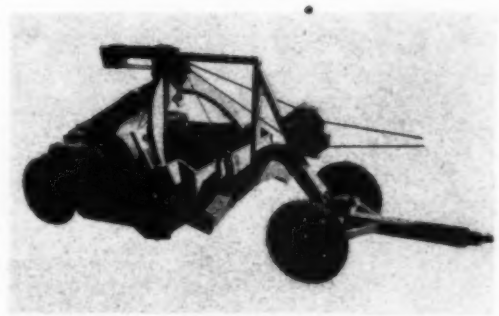

NEW SMALL CARRYING SCRAPER has capacity of 3.5 cu.yd., is of heavier box-type construction, has overhead spring pipe and large carrying apron and eliminates throw-arm for lowering and raising blade and bowl.—**R. G. LeTourneau, Inc., Peoria, Ill.**

★ ★ ★

COMBINED SEWER AND METAL PIPE LOCATOR now does work which formerly required two instruments and is said to result in saving both in first cost and subsequent operation. For use in metal pipe finding, battery and other electrical parts, instead of being located in transmitter are diverted to lost pipe. For quick and reliable attachment to pipes without use of pliers, there is at all times available two reels of insulated copper wire several hundred feet long, inner ends of which are connected to battery and outer ends to spring clips. After use, wires are rewound with crank, thus avoiding entanglement. Amplifying receiving coil, phones and all other apparatus, excepting steel snake, necessary for locating both pipes and sewers are packed in 8½x12x12-in. case.—**Frank N. Blake, North Adams, Mass.**

★ ★ ★

FAN-COOLED MOTOR is said to be especially adapted for use in dusty locations, for precision drives and for other purposes where this type of motor is desirable. Built to meet severe operating conditions and available in standard frame sizes up to 20 hp., either ball or sleeve bearing equipped, latter being of especial interest to manufacturers and users of precision tools where delicate balance and freedom from vibration are important. Features: (1) heavy cast-iron frame

with feet cast integrally; (2) centrally located stator core, permitting assembly with shaft extension at either end; (3) windings without soldered joints — enameled and cotton covered wire; (4) rotor bars, fans and end rings are one-piece, die cast (in one operation) from aluminum alloys; (5) cast-iron fan keyed to shaft; (6) one-piece, cast-iron cowl, including grid—cowl readily removable; (7) ribs on frame and shields provide large heat-radiating surfaces; (8) heavy section ribs forming motor feet are designed so as not to obstruct flow of cooling air from fan along sides and underneath motor; (9) unusually large oil sump provides oil for lubricating bearing; (10) synthetic rubber oil ring operates without foaming of oil; (11) ball or sleeve bearings available; (12) front and rear end shields identical, hence interchangeable. Ratings: 220, 440, 550 v., 3-phase; 220, 440 v., 2 phase; from ¾ to 25 hp. — **Crocker-Wheeler Electric Manufacturing Co., Ampere, N. J.**

"Here's how you can spot the 'criminals' that steal wire rope life...

Look for them regularly... to save your time and money... and America's steel

"IF YOU WANT to get every hour of safe service that's built into your ropes, tell your maintenance men to get up on the cranes and shovels regularly . . . up where the wire rope operates. Tell them how to inspect it . . . how to look for the clues to what is damaging your wire rope and how to establish *your own standards* for deciding when it's necessary and economical to replace your wire ropes.

As a first step, tell them a rope should be judged by the condition of the most severely damaged lay . . . one rope lay being that length of rope in which one strand makes one complete revolution around the rope...

And to select the worst lay, make a counting of the broken wires. Watch to see if the breaks are concentrated in one or two strands. If this is the case, the rope will be considerably weaker than if they are evenly distributed.

You'll probably find some breaks caused by *Abrasion.* In extreme cases they look like this . . .

and even when not worn through, any removal of metal due to wear weakens the rope in direct proportion. Abrasion breaks occur most frequently where rope goes over sheaves and drums.

There may be breaks caused by *Fatigue* which look like this . . .

and occur where the rope has been bent around too small a radius too often or has been subject to vibration or whipping. Fatigue breaks also occur after the wire has been damaged by *Corrosion* which shows up as pitting on the surface of the wire. Improper lubrication is to blame and contributes to tension and abrasion as well.

There may be breaks caused by *Mechanical Abuse.* This cut or gouged wire is one example . . .

Careless handling during installation or an accident on the job may cause cut wires like this or mashed wires with flattened or spread ends. Mechanical abuse sometimes may so weaken the wire that it will fail in tension.

Finally, if there are breaks caused by *Tension* they will look like this . . .

And will show one side of the broken wire cupped and the other coned. Tension breaks are always caused by an overload on the wires, which may or may not have been weakened by abrasive wear, by corrosion, or by mechanical abuse. When tension breaks are found, it is usually obvious that the rope is unfit for further duty and in any event should be discarded.

As a last step, have a record kept of the condition and the service life of each wire rope, cut out the worst section when the rope is taken off and send it on to the manufacturer for an ultimate strength test. This will complete your inspection record and form a basis for future inspection and condemnation decisions.

Then, you'll be on the way to getting the maximum useful rope life built into every inch of Roebling "Blue Center" Steel Wire Rope—without taking chances on untimely and dangerous breakdown of equipment vital to wartime production schedules."

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TRENTON, NEW JERSEY
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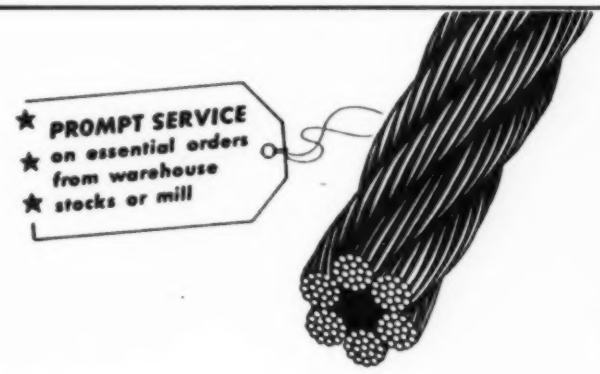

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PREFORMED OR NON-PREFORMED

1½ H.P. GASOLINE POWERED UNIT

● Hand puddling methods are no match for this all-purpose, 9-job MALL Vibrator that will place a stiffer mix faster with important savings in cement, sand, water, and labor. MALL Vibrated concrete assures a better bond with reinforcement; it is free from honey combs and voids; it permits an earlier stripping of forms and makes a stronger, watertight job.

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NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

WOOD EMERGENCY PIPE — **Armco Drainage Products Assoc.,** Middletown, Ohio. (4-p. folder). Describes and illustrates new design in wood drainage structures offered to consumers to replace critical materials, construction of which permits use of short random lengths of wood and obviates need for steel sheets, bands, wire mesh and metal reinforcing. Claimed to assure ample strength to meet engineering requirements. Doweled and interlocking joints provide utmost resistance to bending without breaking or becoming disengaged. Under properly tamped fill, pipe reacts in same manner as flexible metal pipe. Deflects slightly to reduce vertical load and builds up side support, thus gaining additional strength to withstand heavy traffic. Claimed to stand up under heavy loads that cause massive, rigid structures to fail. Diagram shows results of laboratory tests on 24-in. diameter wood culvert. Table lists sizes of Armco emergency pipe.

★ ★ ★

SELECTING PUTTY OR GLAZING COMPOUND— **The Biddle Co.** 612 S. Main St., St. Louis, Mo., (1-p. card) Master Glaziers Putty Selector is convenient, easy-to-use gadget to help sash and door manufacturers, glazing companies and glaziers in selecting correct putty or glazing compound for each particular job.

★ ★ ★

DIESEL ELECTRIC ENGINE FOR INDUSTRIAL SWITCHING — **General Electric Co.,** Schenectady, N. Y. (16 pp. illustrated). Describes and illustrates uses of 25-ton model designed specifically for use in industrial plants and said to embody many features found on railway type switches. Features described: (1) All-welded cab and frame; (2) Self-contained power plant; (3) running gear; (4) heavy-duty, double reduction drive; (5) finger-tip control; (6) electric controls.

★ ★ ★

EMERGENCY SAFETY EQUIPMENT—**Mine Safety Appliance Co.** Braddock, Thomas and Meade Sts., Pittsburgh, Pa. (8 pp. illustrated) This new defense bulletin, covering the complete range of safety equipment needed during war-time conditions features, on the cover, a suggested grouping of essential items at strategic locations in plant or municipal buildings. Inside pages include descriptions of gas masks, helmets, gas detectors, inhalators, asbestos suits, goggles, respirators, first aid kits, foille for burns, stretchers, splints and fire blankets. In addition the bulletin introduces three new special items: the steel helmet, the defense first aid belt and the combination traction splint. The steel helmet, developed for plant guards and repair squads, as well as air-raid service squads, combines strength with excellent wearing comfort. A shock-absorbing inner cradle provides comfortable suspension on the head. Especially designed to be worn about the waist, leaving both hands free, the defense first-aid belt contains a good supply of essential first-aid materials. The belt is of water-repellent canvas, well made and adjustable. The combination traction splint telescopes to a compact size easy to pack and carry. Quickly opened, adjusted and locked, the device is designed for use in supporting fractures of the arms or legs, according to the new traction method.

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DESIGNING, BUILDING and RUNNING SHIPS

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● Do you want a well-rounded knowledge of boilers, turbines, diesel engines, electricity, machinery . . . ?
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WHATEVER information you need — here is just the manual to give you quick, dependable, PRACTICAL answers to your every shipbuilding and shipping question!

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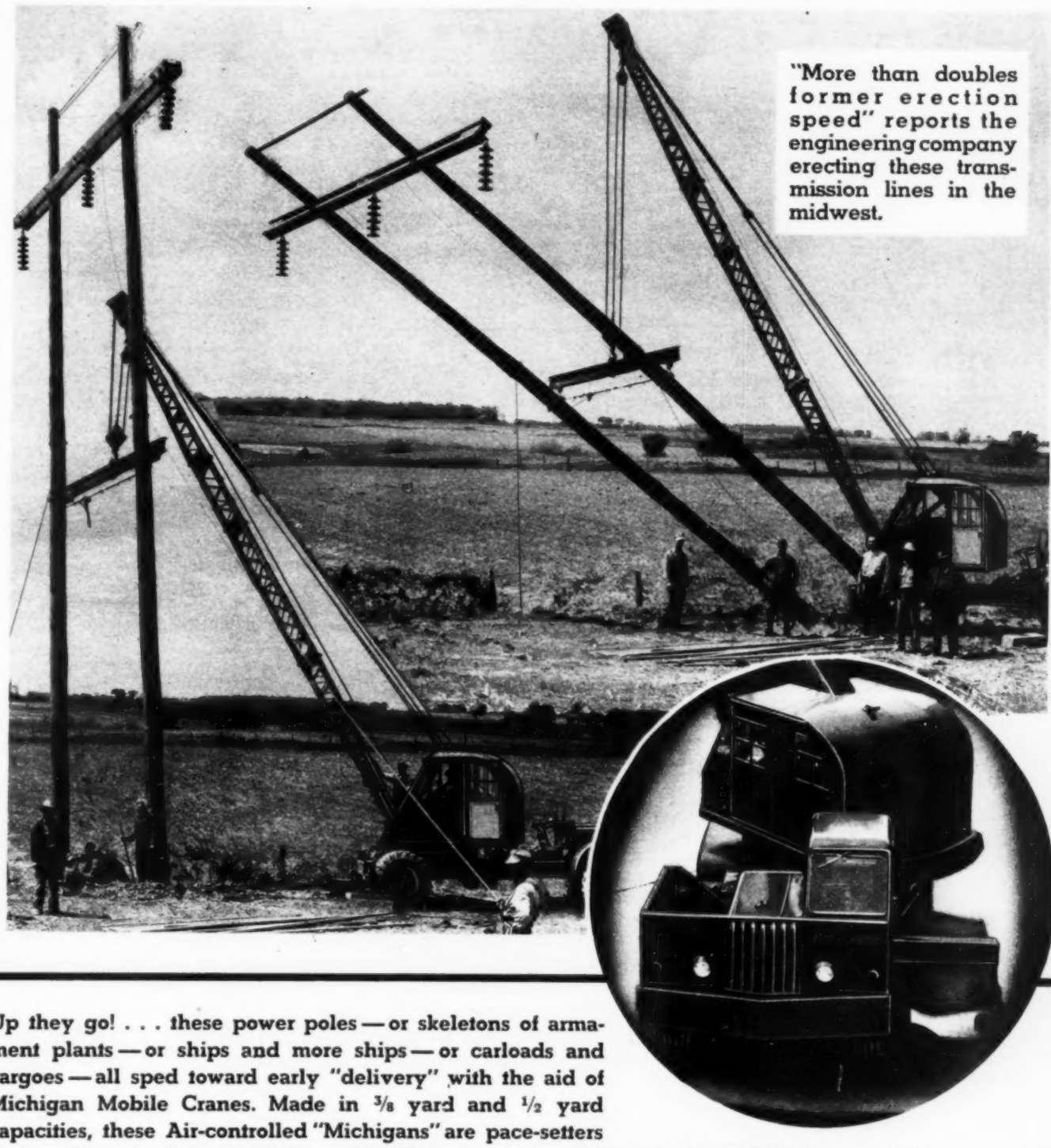

"More than doubles former erection speed" reports the engineering company erecting these transmission lines in the midwest.

Up they go! . . . these power poles — or skeletons of armament plants — or ships and more ships — or carloads and cargoes — all sped toward early "delivery" with the aid of Michigan Mobile Cranes. Made in 3/8 yard and 1/2 yard capacities, these Air-controlled "Michigans" are pace-setters in countless war-time operations today. Your own war program may need Michigan mobility, speed and capacity . . . Toward this end, we offer you the valuable suggestions and cooperation of our engineering staff . . . Write today for Bulletin CM-92 and complete data.

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SHOVELS - CRANES - CLAMS DRAGLINES - TRENCH HOES

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HEY MASTER!
TAKE CARE OF THE
THAT TAKES CARE OF YOUR
It's worth it!
COOPERATE WITH THE WAR PRODUCTION BOARD'S CONSERVATION PROGRAM!

Take care of the Hat that takes care of your Head!

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M.S.A. Products Include: Breathing Apparatus . . . Inhalators . . . Approved Dust Respirators . . . Masks of all types . . . Gas Indicators . . . Gas Detectors . . . Safety Goggles . . . Protective Hats and Caps . . . Edison Electric Cap Lamps . . . Safety Belts . . . Safety Clothing . . . Dust Instruments . . . First Aid Equipment.

DESCRIPTIVE BULLETINS WILL BE SENT ON REQUEST

HIGH-SPEED TRACTOR — **Koehring Co.**, 3026 W. Concordia Ave., Milwaukee, Wis. (16 pp. illustrated). Presents machine, known as "Trail-Dump," as a complete unit with individual assembly illustrations clearly depicting operating functions and many features, such as free oscillating steering axle, constant mesh transmission, spiderless differential assembly, liberal, free-flowing power, "automatic hand" door control, instantaneous dumping, flexibility over rough roads and easy loading.

★ ★ ★

INFRA RED PAINT—**The Arco Co.**, Cleveland, Ohio. (16 pp. and cover illustration). This book tells story of Infray, new kind of infra-red-reflecting, heat-reflecting paint for use in concealment of industrial plants. These dark-colored paints absorb visible light and reflect hect-producing infra-red rays. Chart shows high heat reflection characteristics of this paint. Manufacturer recommends products for roofs and for window blackout. Specifications and color chart.

★ ★ ★

ASPHALT CEMENTS—**The Asphalt Institute**, 801 Second Ave., New York, N. Y. (2 pp.) New sheet, Specifications for Asphalt Cements (Construction Series No. 64), is to be inserted in previously published manual, Asphalt Pocket Reference for Highway Engineers, and in seven following Construction Specifications distributed by The Asphalt Institute: A-1, A-2, A-3, A-4, B-7, B-8 and CL-1.

★ ★ ★

DETERMINING COSTS UNDER GOVERNMENT CONTRACTS — **Superintendent of Documents**, Washington, D. C. (pamphlet, price 10¢). Every company dealing directly or indirectly with Army, Navy, or Procurement Division of Treasury Department, as contractor or subcontractor, should procure a copy of a government pamphlet entitled "Explanation of Principles for Determination of Costs under Government Contracts" wherein may be found for first time in printed form a definite outline of manufacturing and other contract performance cost items, and expenses of an administrative and distribution nature which are allowable under contracts with these three government agencies.

★ ★ ★

SKIP PIPE — **The Robinson Clay Product Co.**, Akron, Ohio. (4-p. folder, illustrated). Picturization and description of vitrified clay, cradle invert type, skip pipe for use in railway maintenance, track drainage and culverts. Lists results of crushing strength tests of pipe by various state highway department laboratories, gives standard specifications for vitrified clay underdrain and describes method of installing pipe.

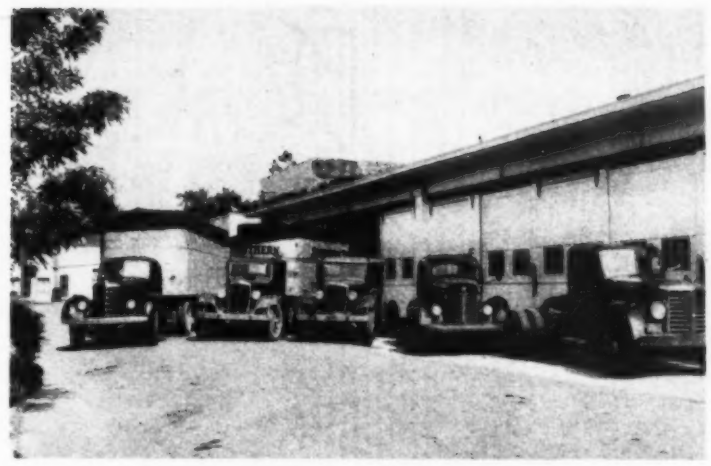
★ ★ ★

GYPSUM LATH — **Gypsum Association**, 211 W. Wacker Drive, Chicago, Ill. (12 pp. illustrated). Contains up-to-date information on gypsum lath, plain, perforated and insulating, and gives graphic descriptions of its features: (1) Fire protection; (2) excellent plaster bond; (3) bracing strength; (4) crack resistance; (5) permanence; (6) speed of erection; (7) economy. Also included are facts about gypsum lath including sizes, weight, fire resistance ratings, sound transmission, insulation and value of insulating gypsum lath as vapor barrier. Last page contains architect's specification.

New heat-proofed

STANOLUBE H. D.

PROVES VALUABLE AID TO FLEET CONSERVATION FOR INDIANA TRUCK OPERATOR



ABOVE: Part of the fleet of Diesel and gasoline tractor trailers operated by the Southern Transportation Company, of Columbus, Indiana. Stanolube H. D. is now helping this company maintain its reputation for frequent, reliable haulage service between Indianapolis and Louisville.

• IN USE just six months, Stanolube H. D., the new heat-resistant, heavy-duty gasoline and Diesel oil, has already eliminated long-standing sludge troubles in the Southern Transportation Company's fleet of Diesels.

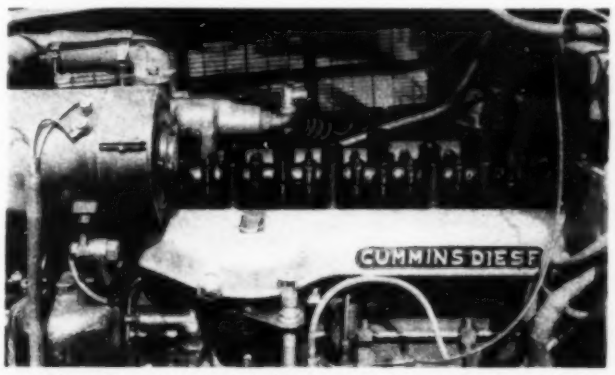
Sludge deposits in this fleet had always been troublesome. In December, 1941, one engine was filled with Stanolube H. D. for testing. The picture below shows the valve assembly on this engine after 50,000 miles of operation. There's not a trace of sludge or deposits. Oil consumption has gradually dropped, showing that Stanolube H. D. not only eliminated deposits, but it cleaned and freed piston rings of deposits previously formed.

All Diesels, as well as the heavy duty gasoline tractors in this fleet, have been lubricated with Stanolube H. D. for six months. Not one engine has needed overhauling.

Civilian use of Stanolube H. D. is restricted, but because of the vital need to conserve your type of equipment, it is available to fleet operators. Carbon, varnish, engine deposits—responsible for a large part of your maintenance and short engine life—practically disappear when you use Stanolube H. D.

Let a Standard Automotive Engineer help you with your fleet conservation plans. Make a test of Stanolube H. D. the first step toward reducing maintenance and making equipment last longer.

BELOW: F. W. Schildmeier, President of the Southern Transportation Company, (left) and C. L. Brooks, Standard Automotive Engineer at Indianapolis, preparing to examine the test engine after 50,000 miles of operation on Stanolube H. D.



ALL ENGINES are cleaned regularly on the outside in the Southern Transportation Company's fleet. Now, with Stanolube H. D., engines are clean both inside and out. This is how the test engine looked after 50,000 miles of operation on Stanolube H. D. Not a trace of sludge. •

GET ALL THE FACTS ON HEAT-PROOFED STANOLUBE H. D.

This folder "Beat Heat—Your Engine's Enemy No. 1" tells why modern heavy-duty gasoline and Diesel engines last longer with this heat-proofed oil—tells how it reduces engine deposits that cause high maintenance. Send for a copy. Write Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago, Ill. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

Sign up your fleet in the Office of Defense Transportation's Truck Conservation Corps. Help in this vital war effort by keeping your trucks rolling for the duration.

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U.S. TRUCK
CONSERVATION CORPS

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FLEET CONSERVATION SERVICE

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● Write for Catalog 42-P

SCHRAMM . . . a name that stands behind the product! A product that is aiding your Uncle Sam to build the best Army and Navy in the World. You'll find SCHRAMMS everywhere because owners have found that their Longlife . . . Lightweight . . . Compact Dimensions . . . Automatic Controls . . . Efficiency . . . and Flexibility mean profitable contracts. SCHRAMMS are either gasoline, diesel or electric powered and are built in sizes 20, 50, 60, 85, 105, 210, 315, and 420 cu. ft. per minute of actual air delivered.

All SCHRAMMS are water-cooled for heavy duty work under all weather conditions, providing the same degree of uniformity in cooling, either in extreme hot or zero weather.

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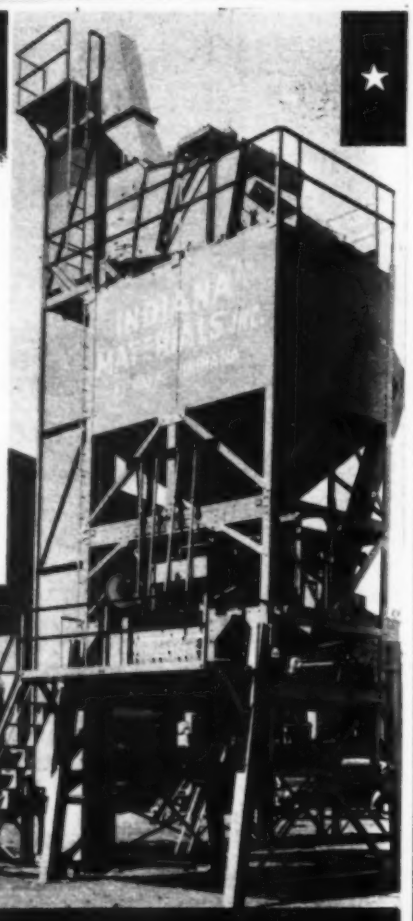

The order of the day is to get the job done quickly. Now in use on airport runways, in new defense plants, and in many new army cantonments throughout the country, Hetherington & Berner equipment is helping to meet this challenge.

Model PA plants are ideally suited to this type of work as they can be quickly set up and will produce large tonnages economically.

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A limited number of these plants are available to defense contractors on short delivery.

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Inquiries are invited.

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HOW TO USE HAND SHOVELS—**Union Fork & Hoe Co.,** Columbus, Ohio. (8 pp., 4x9-in. size, illustrated.) In this booklet of vest-pocket size the makers of Razor-Back hand shovels give fourteen practical suggestions on "How to Get More Work Out of a Shovel." Tips that make digging easy are illustrated with sketches indicating "Right" and "Wrong" methods in sinking the blade, taking the proper "bite", lifting the loaded blade, gripping the handle and placing feet in proper stance. Here is information that construction foreman can pass along to their shoveling crews.

★ ★ ★

TRUCK-MIXERS—**Chain Belt Co.,** Milwaukee, Wis. (23 pp., illustrated). Bulletin No. 405 describes and illustrates mechanical features of Rex high-discharge moto-mixers and agitators and gives complete specifications and operating data. Among features of equipment are fast end-charging through 32-in. drum opening, visible batch mixing, thorough mixing, anti-freeze water system, positive discharge, five-in-one discharge chute, chain-belt drive and roller-bearing drum mountings.

★ ★ ★

PAINT GUIDE — **United States Gypsum Co.,** 300 W. Adams St., Chicago, Ill. (28-p. booklet). Comprehensive directions for obtaining best results with paint products manufactured by this company. Lists paints available for various uses and gives instructions on how to prepare surface, method of mixing, tinting, application and cleaning. Also covering capacity, manner of packing, colors and storage.

★ ★ ★

SOIL-CEMENT MIXTURES—**Portland Cement Association,** 33 West Grand Ave., Chicago, Ill (80 pp., illustrated.) Laboratory handbook is principally devoted to methods of making tests to insure dependable results with soil-cement mixtures. The moisture-density test, the wet-dry test, the freeze-thaw test, and compressive strength test are covered in detail. Also discussed at length are methods for identifying and classifying soils so that they can be grouped according to their common characteristics, and method for utilizing this information in selecting samples of soil for soil-cement testing. Handbook also includes a brief review of research on soil-cement mixtures.

★ ★ ★

CONDUIT SYSTEMS—**The Ric-wiL Co.,** 1562 Union Commerce Bldg., Cleveland, Ohio. (12 pp., illustrated.) New bulletin on underground and overhead pre-fabricated unit and tile conduit systems presents pictorial factory pre-fabrication views, as well as typical defense plant installations, where strength and speed of installation are required. Shown, are typical conduit fittings, pipe supports, glands, and pre-fabricated expansion loops complete with engineering details. Ric-wiL offers a system for steam, hot water or oil lines complete with piping and insulation as specified, all factory pre-fabricated and delivered to the job ready for assembly. Suggested specifications and engineering details are included, as well as tables of conduit capacities and required trench dimensions for each diameter unit. Illustrations and engineering details on tile conduit, standard type "F", universal type, and super-tile conduit systems also are included. Cast iron, for use under or near railroad tracks where special strength is required, is also described.

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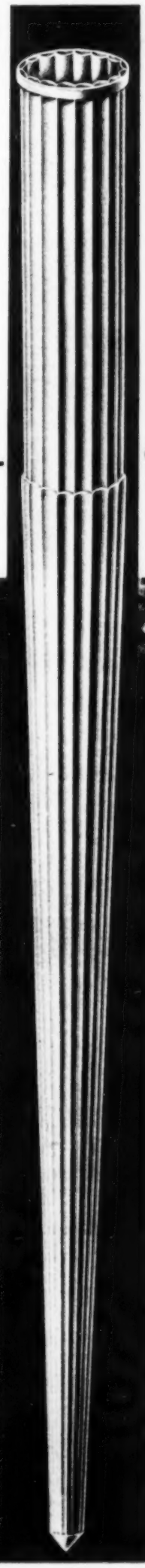


Our Slogan—"*More Production* Means *Axis Destruction!*"

Nothing goes up until the piling goes down—therefore any method of pile construction that will even reduce by hours the established schedule, is highly desirable at the present time.

Job records show the use of Monotubes for the installation of cast-in-place concrete piles has resulted in time savings of many days, yes, even weeks. Here's why:

1. *SPEEDY Handling.* Monotube steel casings are light in weight for fast and economical handling.

2. *SPEEDY Driving.* Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment (crawler crane, equipped with standard leads and hammer).

3. *SPEEDY Extension.* Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste—even in low headroom.

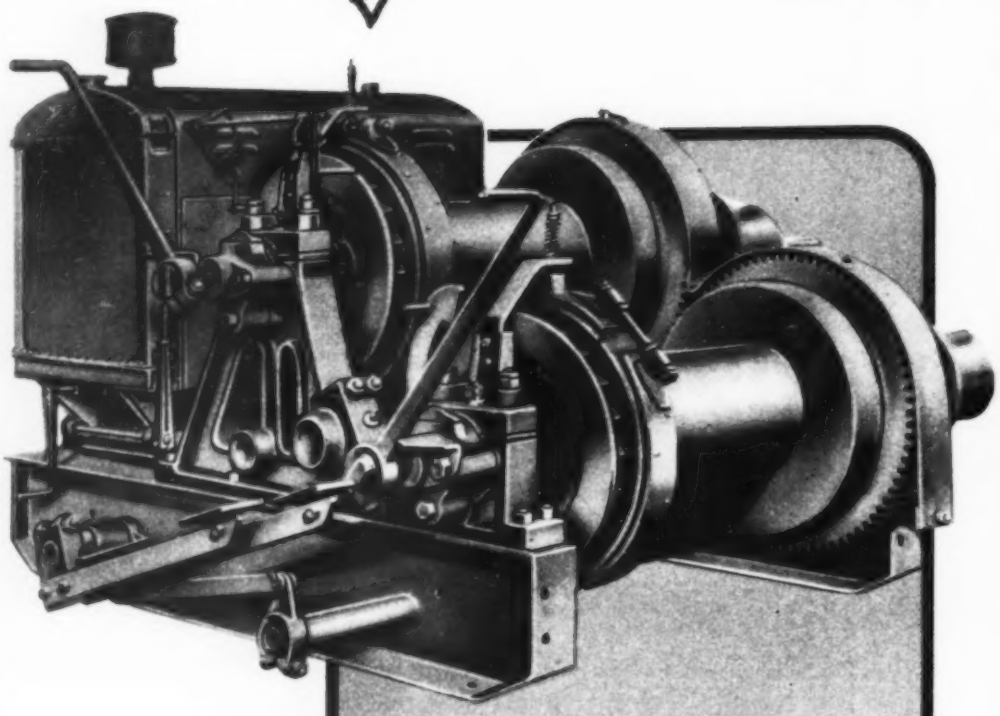
4. *SPEEDY Inspection.* Hollow, tubular design enables you to inspect casing quickly and thoroughly from top to toe, prior to concreting.

Union Metal Monotubes are made in a gauge, taper, and size to meet load-bearing requirements in *any* soil condition. Experienced Union Metal engineers will show you how they can be used to best advantage. Write today for Catalog No. 68A.

Our Slogan—"*More Production* Means *Axis Destruction!*"

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO

CLYDES *give better service*



If you are fortunate enough to own a Clyde hoist, you know it is a husky machine built to give many years of top-notch performance. During these critical times extra care should be given it to help increase its efficiency and prolong its life.

Proper lubrication is very important to the life of any machine. A few minutes a day will reduce wear through friction and add years of service. If you do not have a lubrication bulletin that shows the proper lubricants and how to apply them, we will gladly send one.

Careful periodic adjustments of frictions, brakes and all wearing parts will also do much to give more efficient and satisfactory performance. Keep all bolts tight. Note parts subject to wear and replace, if necessary. Proper care of your hoist will keep it running.

CLYDE

CLYDE IRON WORKS, Inc.

DULUTH, MINN.

STABILIZED BASES—**Solvay Sales Corp.,** 40 Rector St., New York, N. Y. (22 pp., illustrated) Booklet, "Better Bases for Better Surfaces," condenses information from recent reports on compaction and density necessary to assure ultimate stability of various types of graded aggregate bases. It also describes methods of obtaining proper density with less water and compactive effort. Other sections cover: (1) treatment of bases for frost prevention and (2) specifications for construction of bases with various types of materials.

★ ★ ★

MANGANESE STEEL FOR CRUSHER, GRINDING MILL AND PULVERIZER PARTS — **American Manganese Steel Div., The American Brake, Shoe and Foundry Co.,** 389 E. 14th St., Chicago Heights, Ill. (24 pp. illustrated). Lists uses and advantages of manganese steel in manufacture of foregoing parts of machinery: (1) Reduces out-of-service time and maintenance costs; (2) saves by reducing wearing parts' costs per ton of material to minimum. Described and illustrated are: Jaw crusher parts; jaws, liners, toggle seats; roll crusher parts; gyratory and cone crusher parts; grinding mill parts; screen plates; pulverizer parts; single arm, double arm, two-part and ring-type hammers; ball or roller mill; hammer-mill liners; hammer-mill grates and grate bars; hammer-mill breaker plates. One page is devoted to answering question, "What is Manganese Steel?" Another to discussion of improvements made in castings by use of X-ray. Another is devoted to pictures taken in metallurgical research laboratory, Mahwah, N. J.

★ ★ ★

HELP PUT *Empty Cylinders* TO WORK

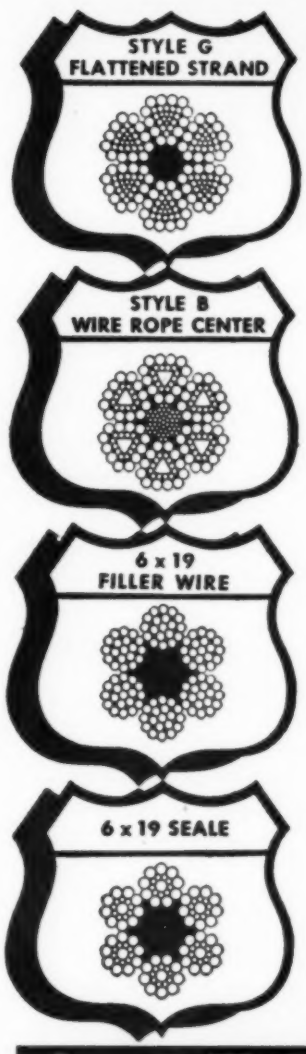
PRODUCTION REQUIREMENTS today are such that there is an increased demand for oxygen and acetylene. This demand can be met if empty cylinders are returned promptly and if cylinder stocks in the hands of users of oxyacetylene welding and cutting are maintained at a minimum.

Cylinders must be kept moving. They must not be permitted to stand idle, either full or empty. The cylinder supply, now the most important factor in the distribution of compressed oxygen and dissolved acetylene, is still deemed adequate to keep these gases continually and readily available to essential users if all will cooperate in speeding up turnover rates.

Also, refrain from ordering more oxygen or acetylene than is required for immediate needs. Many shops allot not more than three oxygen and three acetylene cylinders to every two welding or cutting outfits in active service. This plan permits a 50 percent reserve.

This appeal is made just as much to small shops, using two or three cylinders a month, as it is to large plants using up to one hundred or more cylinders a month. For every day a cylinder is empty and idle is a day lost out of its productive life regardless of the size of the shop.

When You Pick The Wrong One . . . You Lose

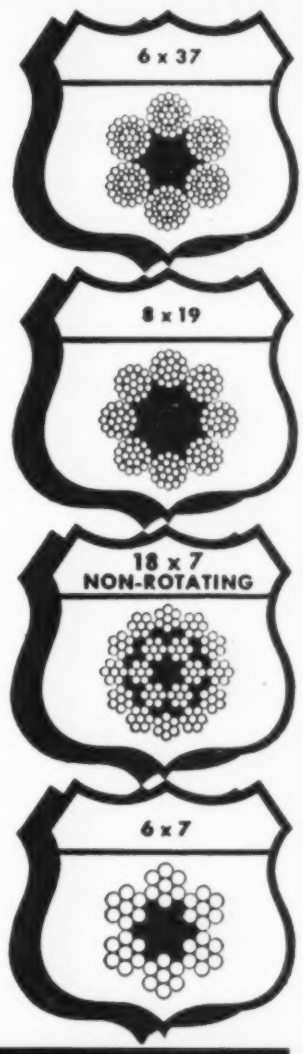


And it is the same with wire rope.

As wire rope is used for many purposes, it is made in a wide range of grades, constructions and types. To obtain maximum results it is necessary to select the rope most suitable for the particular work it is to do . . . . the one that can win under the existing conditions.

When the "right rope" is not used, you are losing both time and money because replacements will have to be made more often; and what is *more* to the point—steel urgently needed for ships and shells is being wasted.

The accompanying illustrations show a few of the many wire rope constructions that are available. These can be furnished in different grades—either Preformed or Non-Preformed. They can also be supplied with either a hemp core, or a wire center of the type best suited for the job. Our experienced Engineering Department is at the service of all wire rope users to help make the proper selection. Feel free to consult us.



A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS — ESTABLISHED 1857

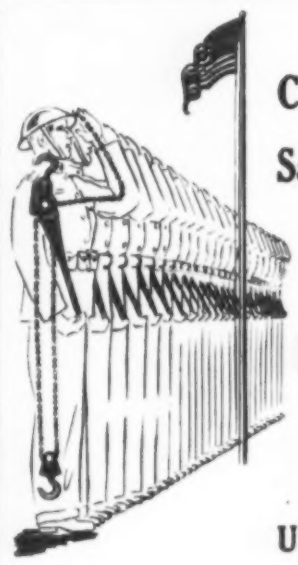
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

"HERCULES" (RED STRAND) WIRE ROPE

NEW YORK	90 West Street	SAN FRANCISCO	520 Fourth Street
CHICAGO	810 W. Washington Blvd.	PORTLAND	914 N. W. 14th Avenue
DENVER	1554 Wazee Street	SEATTLE	3410 First Avenue South

You can depend upon the greedy jaws of Industrial Brownhoist clamshell buckets to speed up your material handling. Their deep clean bites practically eliminate hand shoveling. Fast opening and closing action. Extra sturdy. Minimum rope wear and maintenance. Standard types (rope-reeve, power-wheel and link-type) in stock for immediate delivery. Write for further information.

INDUSTRIAL BROWNHOIST
BAY CITY, MICH. • DISTRICT OFFICES
NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO



COFFING
Safety Pull
RATCHET
LEVER
HOISTS
are on
the job for
UNCLE SAM

Conserve your Hoists
and
★ HELP WIN THE WAR ★

See your Distributor or Write for
Catalog No. D G-6

COFFING HOIST CO.
Ratchet Lever, Spur Geared
and Electric Hoists
800 Walter St. Danville, Ill.

If Your Tire Goes Flat

IF YOUR TIRE GOES FLAT on you this summer, either through a blowout, puncture, or other cause, stop just as swiftly as you can and stay stopped until the tire is changed! That is the advice of of tire engineers of The B. F. Goodrich Company, a friendly tip to motorists during the critical tire shortage caused by the war.

Why is this? It is because the almost priceless casing, in these days of no new tires, may be damaged beyond repair if driven flat, even though the distance traveled is only a few hundred feet.

Stop, and you have a good chance to save the tire, have it repaired, and keep the automobile operating. Run on it while it is flat, the cords and fabric will rupture, no repair be possible, and the car may have to be laid up. So, either change the tire yourself, then and there, or call a service station or garage to do it for you. Even the extra expense will pay if you can save the tire and have it repaired for further mileage, B. F. Goodrich engineers point out.

Don't take off the tire and drive on the rim! These engineers say that such a practice may bend or scar the rim badly, it may even crack or dent the brake drum. Repairing or replacing these parts in war time is difficult, might be impossible, and this too, might result in putting the car out of service.

★ ★ ★

Report Now Available on *Chickamauga Project*

THE TENNESSEE VALLEY AUTHORITY announces the publication of Technical Report No. 6, The Chickamauga Project, on the planning, design, construction, and initial operations of the Chickamauga project on the Tennessee River.

This volume describes the Chickamauga project and how it fits into the program for unified development of the Tennessee River system. It covers preliminary investigations for the project, including geology, river flow, and social and economic studies; lock, dam, and power-house design; access routes to the damsite; construction methods, including construction plant and river diversion; relocation and adjustments

(Continued on page 99)

The Equipment Distributor
can conserve
your machinery

Valuable equipment, built for years of service, falls short of requirements whenever neglected. New equipment is highly restricted because it takes materials needed so badly for other war purposes. Present equipment can quickly be restored to dependable operating condition by replacement of worn parts. Gorman-Rupp Distributors stock parts for equipment they sell and repair all makes of machines, Mixers, Pumps, Shovels, etc., at reasonable prices. You will help win the war when you conserve valuable equipment by having a Gorman-Rupp Distributor repair it NOW.

Keep 'em Pumpin'

THE GORMAN-RUPP CO.
MANSFIELD, OHIO

GORMAN-RUPP PUMPS
UNSURPASSED FOR PUMPING FAST

G & R Pumps are not "frozen". All Gorman-Rupp Distributors have them for immediate delivery.

ASK
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ONLY
SHOVELS
with
Blade Edges
GUARANTEED
SPLIT-PROOF

INGERSOLL SHOVELS
"The Borg-Warner Line"

Write for Catalog and Prices
INGERSOLL STEEL & DISC DIVISION
BORG WARNER CORPORATION
NEW CASTLE, INDIANA
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.

made necessary by creation of the reservoir; initial operations; and a complete summary of the project costs. The appendixes include a complete statistical summary of the physical features of the project; reports of engineering and geologic consultants; summaries of special tests such as model studies; the rules and regulations of the employees' retirement system; the agreement between Tennessee Valley Trades and Labor Council and the TVA; and the TVA Acts. Bibliographies on each phase of the project are also included.

The Chickamauga Project, containing 451 pages and 97 illustrations, is No. 6 in a series of technical reports on projects completed by TVA. Cloth bound copies may be procured from the TVA Treasurer's Office, Knoxville, Tennessee, at $1.00 each. The first three reports on The Norris Project, published in 1939 ($1.50), The Wheeler Project, 1940 ($1.00), and The Pickwick Landing Project, 1941 ($1.00), may be procured from the Superintendent of Documents, Washington, D. C., at the prices indicated. Technical Report No. 4, The Guntersville Project, 1941 ($1.00), may be procured from the TVA Treasurer's Office, Knoxville, Tennessee. Publication of Technical Report No 5, The Hiwassee Projects, is being postponed pending completion of recently authorized additional projects in the Hiwassee River Basin.

★ ★ ★

Color Perception Test

BECAUSE 4 PERCENT of all males and one-half of 1 percent of all females are color blind, plant managers, personnel men and industrial physicians will probably be interested in American Optical Company's new color perception test which has been approved by the Surgeon General of the U. S. Navy and is used officially by both the Navy and Army.

Many workers such as inspectors, research men, truck drivers and railroad men should have faultless color perception for safety and efficiency, the optical concern points out, and this important element of sight can only be ascertained by an accurate color perception test. In most cases, it should be remembered, the victim of color blindness is not only unaware of his condition, but will not be convinced unless given and authorized test.

The new American Optical color perception test is especially devised for ease of operation and universal application. Bound in blue cloth with gold lettering, the 46 test plates are arranged so that malingerers are quickly detected and ordinary blue and green cases of color blindness may be discovered by using

(Continued on page 100)

Heaping loads increase the yardage gains these LeTourneau Carryall Scrapers get for Coggins & Deermont, Chipley, Florida, contractors, who work this cut both ways and spread at either end as shown in Fig. 1.

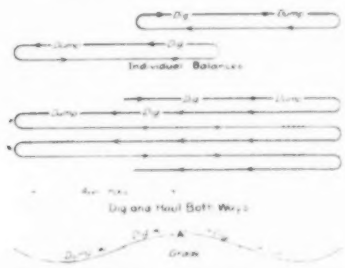
Convert Turning Time into

Extra Yardage and Extra Profits

Get More Loads in Less Time with Your Present Equipment by Using These Victory-Speeding Cut-and-Fill Methods

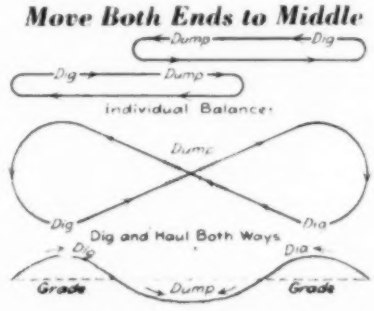
The two job-proved methods shown here are applicable on almost every airport, access road, base or other Victory project requiring earthmoving. By applying them you reduce round-trip time, consequently increase the number of loads and yardages you can move with your present tractor-drawn LeTourneau Carryall Scrapers and with Tournapulls.

Spread Cut Two Ways



When this cut is worked in individual balances, 2 turns are required for each load. By cutting both ways and spreading at both ends, you handle 2 loads with but 2 turns.

Move Both Ends to Middle



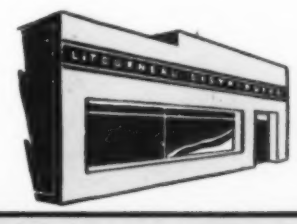
Here again you save time by moving 2 loads with 2 turns instead of 4. Each turn eliminated gains an average of 0.25 min.

Assume a 10 pay yard load and 5.0 min. per load, then on the basis of individual balances you could deliver 120 cu. yds. hourly. With either of the above turn-eliminating cycles, you save 3.0 min. on 12 loads, thus increase your hourly yardage to 126 cu. yds.— a gain of 126 cu. yds. per Carryall Scraper per 21-hour day. At 15¢ a cu. yd. this elimination of turns amounts to $18.90 per day or $9,000 on a 10,000-hour operating life!

Figure the gain in yardage and extra profit for your own Carryall Scraper fleet and job — gains will vary with scraper size and haul distances, but you'll find the method always increases the number of loads and yardage — *without an increase in equipment.*

SEE YOUR DEALER

Any time you need help on job planning ideas for getting maximum yardage and lowest costs with LeTourneau equipment, call on your local LeTourneau-"Caterpillar" dealer. He also has parts and factory-trained servicemen to keep your equipment working at full efficiency for Victory. See him TODAY!



LETOURNEAU

Manufacturers of DOZERS, CARRYALL® SCRAPERS, POWER CONTROL UNITS, ROOTERS®, SHEEP'S FOOT ROLLERS, TOURNAPULLS®, TOURNAROPE®, TOURNATRAILERS®, TOURNAWELD®, TRACTOR CRANES. *Name Reg. U. S. Pat. Off.

TAPER ROLLED BLADE

Strongest construction open back type. Heavy section extends full width of blade from top to point of frog where strain is most severe. Blade and socket heat treated.

RIVETLESS SOCKET

No rivets. Socket is smooth and elimination of rivet holes increases strength of handle.

HANDLES

Northern ash. Attractively finished with a walnut color. Bug-proof lacquer.

•

• Perfect balance. Supplied in D and long handle. Round and square point.

(Continued from page 99)

not more than two or three charts. The extent of the weakness of color perception is indicated by a single reading of several key plates. A small instruction handbook accompanies each test which can be given by anyone with the aid of the book. Further information can be obtained from the American Optical Company, Southbridge, Mass.

★ ★ ★

Pentagon For War Department Offices

(Continued from page 68)

to accommodate 25-30,000 workers, but even this capacity may not be adequate for the Washington staff of the War Department. Outer walls are faced with limestone, but inner walls on the court are finished in exposed architectural concrete.

Vast size of the building led the constructors to adopt transit-mixing from a central batching plant for concrete distribution. Tower hoists and chutes deliver mixed concrete to hoppers from which buggies wheel it to points of placement. Truck-mixers handle 4-yd. batches, and 1- and 1½-yd. tower hoists raise the concrete to hoppers feeding the chutes. Of 20,000,000 b.ft. of lumber used on the job, nearly all is for temporary construction, much of it in forms for reinforced columns, beams and slabs.

Batching plant capacity was designed for 3,000 cu.yd. of concrete per day. To speed construction of a barge basin for water delivery of aggregates, an area adjacent to the batch plant was excavated by land equipment to 14 ft. below river level, partially protected by well points, and the basin was opened by cutting through an intermediate dike with a dipper dredge from a lagoon which will form part of the permanent landscaping. Convenient location of the batch plant, with attendant barge basin for aggregates and rail delivery for cement, shortened truck-mixer haul and eliminated rehandling of materials, thus effecting an estimated saving of 35c. per cu.yd. of concrete.

All concrete ingredients, including water, are weighed. Determination of surface moisture for each size of aggregate is made by a displacement method, said to be accurate within about one-fourth of 1 percent, using specially designed scales of great accuracy. Moisture tests, made at frequent intervals by this method, require less than 1 min. and are so simple that they can be run by the weighman if necessary. Compensation for moisture is made on a special batching scale having a separate beam and poise for each ingredient, including water. By adding disks calibrated in percents to the compensating poise, weights can be increased by any desired percentage.

PREFABRICATED PANEL FORMS are marked with identifying lettering for repeated use.

Project Personnel

Lt. Col. Clarence Renshaw is district engineer in charge for the Corps of Engineers, U. S. Army. For the contractors, J. Paul Hauck is general superintendent, and Tom Moore and D. A. Davis are assistant general superintendents. Potts & Callahan were subcontractors for earthmoving, the Howat Concrete Co. furnishes the concrete, and the Scientific Concrete Service Corp. supplies and services the special batching and moisture determination scales.

★ ★ ★

Well-Planned Batch Plant

(Continued from page 66)

from this cement compartment passes down a pipe to a 450-bbl. reserve storage bin. The reserve storage bin is located over the worm screw which conveys cement from the hopper under the railroad track to a bucket elevator, feeding the bin above the batcher.

Sand, cement and coarse aggregate are drawn off the bins through manually controlled gates and are weighed individually by beam scales. Water is

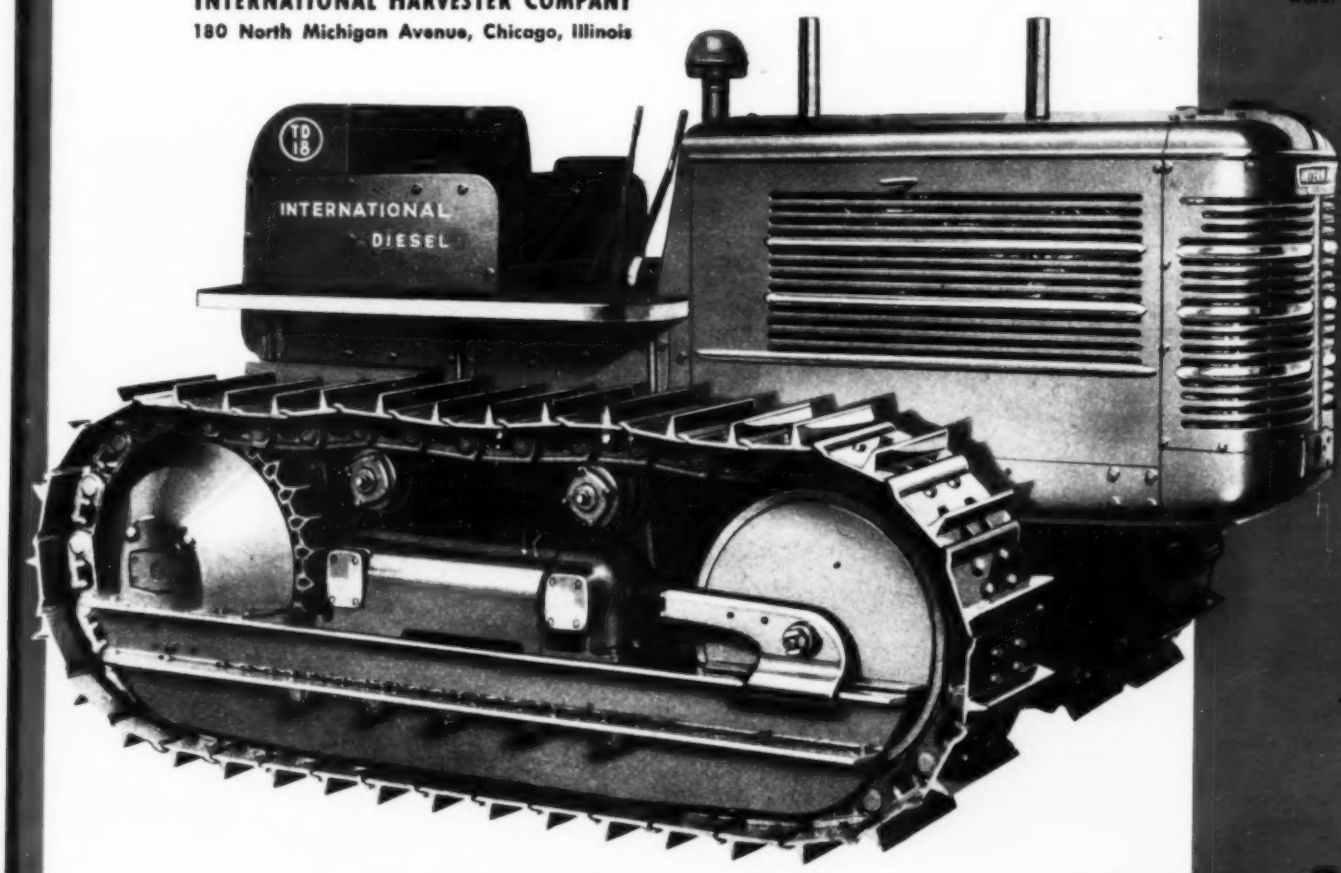
(Continued on page 102)

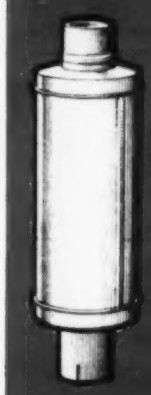
MAKE YOUR TRACTRACTOR EXTRA TOUGH WITH THESE VICTORY ATTACHMENTS

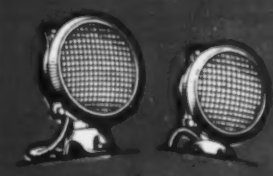
MACHINES take an extra dose of bruising in times like these. There's vital work to do—and it must be done now! If you operate an International TracTracTor, your hauling, pushing, and pulling is being handled by one of the toughest things that crawls. It's good to know your tractor can take punishment without being babied every step of the way. And here is something else that's good to know! You can make your TracTracTor extra tough and do extra hours of work every day with the help of International Victory attachments.

What are Victory attachments? Take a look at the drawings on this page. These attachments are added to TracTracTors built for the Victory Pool, released to eligible users by the W. P. B. You can bring your TracTracTor up to Victory specifications by ordering the attachments you need. See the nearby International Industrial Power dealer.

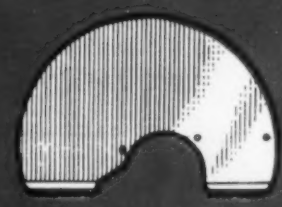
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago, Illinois

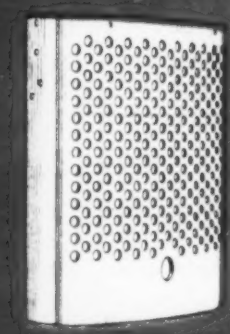


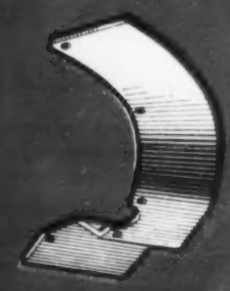

Exhaust muffler attachment.

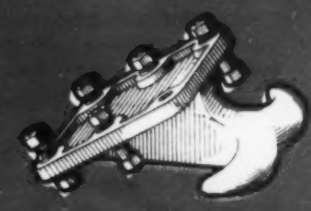

Head lamps. Permits night work.

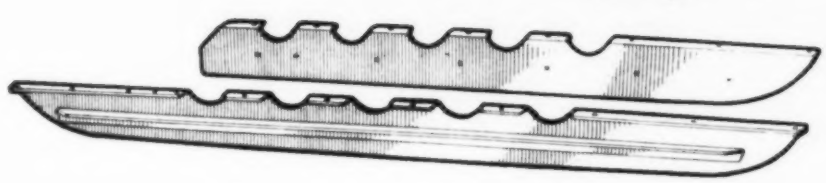
Head lamp guards. Protects lamps from breakage.

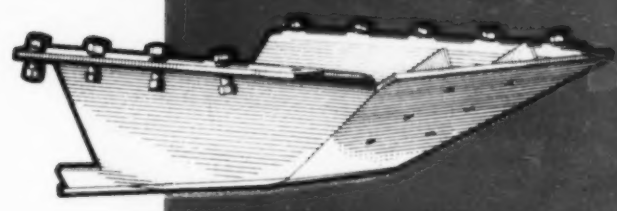

Front idler shield attachment. Prevents damage from stones.


Radiator guard. Extra toughness for extra tough work.


Sprocket rock deflector. One for each side.


Front pull hook attachment. Handy in many ways.


Heavy duty track roller shield attachment.


Crankcase guard attachment. Protects oil pan.

INTERNATIONAL Industrial Power

STRIKING POWER

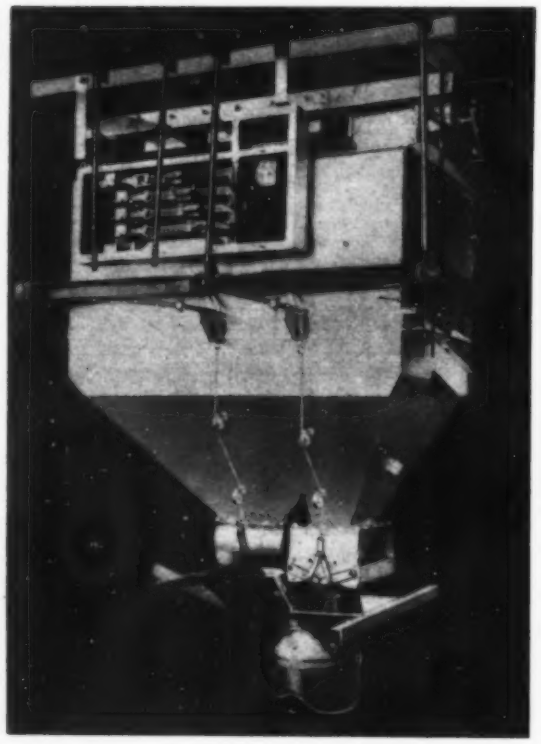
to penetrate the enemies defenses or to penetrate the toughest materials being excavated. Both are essential for successful operations. Versatility is an old Owen attribute and specially hardened teeth of various types can be readily adapted to many Owen Models to increase digging efficiency. To realize the most on your bucket investment, investigate Owen teeth and attachments.

THE OWEN BUCKET CO.
6020 BREAKWATER AVE., CLEVELAND, O.
BRANCHES: NEW YORK, PHILADELPHIA, CHICAGO, BERKELEY, CALIF.

OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

TEN REASONS WHY THE BUTLER AGRACEMENT BATCHER WILL DO IT BETTER

- Entire scale system is simpler, more rugged, and trouble-free. There are no cast iron parts to break.
- Raised graduations on scale beams permit easy reading.
- Self-locking poises seat themselves accurately, require no thumbscrews.
- No clumsy shot cups to balance beams; poise type weights are used.
- Tell-tale dial mounted on scale beam indicates balance plainly, will not bind like stationary type.
- Compact beam box is handier, keeps cleaner.
- Two compartment hopper is all-welded of heavy plate, has steep, obstructionless slopes.
- Exclusive Twist-of-the-Wrist discharge is faster and simpler to operate than any other type; permits close grouping of all operating levers.
- Clamshell gates have no racks or gears, cannot jam.
- Entire batcher is compact, rugged, and efficient, occupying less room and providing greater convenience of operation.



BUTLER BIN COMPANY • Waukesha, Wis.

(Continued from page 100)

weighed in a tank by another beam scale. A 4-yd. batch can be measured and discharged into a truck mixer in slightly less than 2 min. The cement discharge is equipped with a vibrator. A typical batch requires 2,144 lb. of cement, 5,432 lb. of sand, 7,872 lb. of stone and 122 gal. of water, including the moisture in the aggregate.

Compressed air pipes to the cement bin over the batcher aerate the cement when necessary to prevent arching above the discharge gate. During the winter the plant furnished high-early-strength batches only, but with the return of warm weather the plant was called upon to supply both normal-strength and high-early-strength cement, the two kinds of cement being used for separate pours which are not made concurrently. To change the type of cement, the bin above the batcher is emptied, and a car containing the alternate type is spotted over the undertrack hopper.

For heating in cold weather, the bins are surrounded with outside steam coils covered by an insulating blanket consisting of a layer of sheetmetal, a cork core and an exterior layer of plywood. Mixing water was heated in two 13,000-gal. asphalt tank cars, which were not needed for asphalt transportation during the winter. The cars were thoroughly cleaned and were parked on a railroad track at the plant.

Handling Aggregates

Aggregates are unloaded and bins are charged by a Lorain crane with a 2-yd. clamshell bucket. When the plant is in operation, a tractor-bulldozer is kept in almost constant service moving stockpiled materials within range of the crane and shifting cement cars on the track. On days when concrete is poured during two shifts, requiring up to 1,500 cu.yd. in 16 hr., a second crane is brought in to unload barges, and the depleted stockpiles are built up during the third shift.

An Executone two-way communication system speeds dispatch of truck mixers. The system includes stations with loudspeakers and telephones in the dispatcher's office at the batch plant, on the batching platform and in the headquarters of the production engineer in the contractors' main office. Other stations are located in the garage and the labor shanty. By means of the two-way system, orders are transmitted in either direction between stations.

Concrete is mixed and delivered in Rex Moto-Mixers. As many as 29 rented truck mixers are available from subcontractors for calls to the job, but no more than fourteen are used on an ordinary day. A fleet of this size will take care of 1,400 to 1,500 cu.yd. in two 8-hr. shifts.

Supervision

Construction work on the project is under the direction of the Bureau of Yards and Docks of the Navy Department. Lt. Comdr. E. A. Verpillot, for-

(Continued on page 104)

not "too little and too late" but *Much...on time*

Without realizing it—we, the least warlike of nations, have long been readying ourselves for war.

We have not yet hit our production stride. But we will—soon. And our success, when it comes, will be the success of ***preparation in advance of the need.***

Preformed Wire Rope is one example, duplicated in scores of other industries.

First introduced in 1924, Preformed gradually sold itself to industry by doing more work, with greater safety, for less money.

Today when *more work, with greater safety, for less money* is a war production "must", Preformed is in demand throughout the nation.

Furthermore, Preformed, because it lasts longer, saves an important tonnage of steel.

All this is a tribute to American thinking and doing. It is typical of thousands of American products in different channels of production.

Preformed wire rope

One of America's Industrial Pacemakers

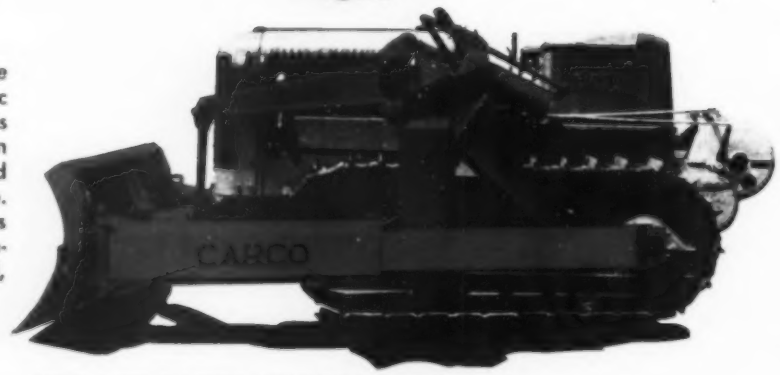
ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER

★Available for prompt delivery

Brand new CARCO bulldozers and roadbuilders for Allis-Chalmers tractors are ready to ship upon receipt of orders. Made of high tensile steel with grader blade steel cutting edge, these units are dependable and tough, proven in both the logging and construction industries.

The bulldozers and roadbuilders offered for sale are stock items, and are available to you NOW at June, 1941 prices. All units are offered subject to prior sale.

Front Lift Cabledozer with adjustable type moldboard. One convenient lever controls both brake and clutch of the hoist.



Side Mount, Angle Blade Hydraulic Roadbuilder. This model is driven by front mounted hydraulic pump. Control valve has four operating positions: Lift, Hold, Dig and Float.

CHECK YOUR NEEDS AGAINST THIS CHART:

CARCO MODELS AVAILABLE	A-C HD-14	A-C HD-10W	A-C HD-10	A-C HD-7W	A-C WM
Side Mount, Angle Blade Hydraulic Roadbuilder	X		X	X	X
Front Lift Cabledozer with Adjustable Type Moldboard	X	X			
Front Lift Cabledozer with Rigid Type Moldboard		X			
Side Mount, Straight Blade Hydraulic Bulldozer					X

WIRE OR AIRMAIL YOUR ORDER TO

PACIFIC CAR AND FOUNDRY COMPANY, Renton, Wash.

or place with your local Allis-Chalmers industrial dealer

(Continued from page 102)

merly executive officer, is now officer in charge of construction.

For the contractors, G. W. Bailey is project manager, and J. B. Hoffmier is production engineer. The contract is held jointly by the Wigton-Abbott Corp. and the Mahony-Troast Construction Co.

★ ★ ★

On-the-Job Maintenance

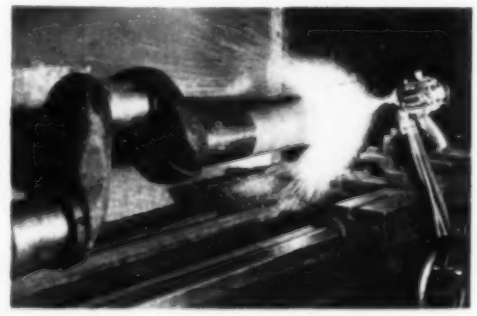
Utilizes Metallizing To Rebuild Worn Equipment Parts

(Continued from page 54)

solid metal therefore, all press fit diameters inside over 3½-in. diameter, and outside to any diameter, are good applications.

Wear-resistant qualities of sprayed metal are better in most instances than those of hardened solid metal. Therefore, all bearing surfaces (except those upon which rollers operate under compression) are ideal applications.

Original hardness of sprayed metal depends largely on the material used, but 500 Brinnel is quite common. In contrast with solid metal, hardness of sprayed metal does not indicate its wear resistance, because the natural porosity



FLYWHEEL END of compressor crankshaft is built up with metallizing gun spraying hard, long-wearing steel on prepared surface for finishing to original dimensions.

of the sprayed metal lowers its coefficient of friction from 10 to 15 percent and because most commercially-used sprayed metals work-harden in service to a marked degree.

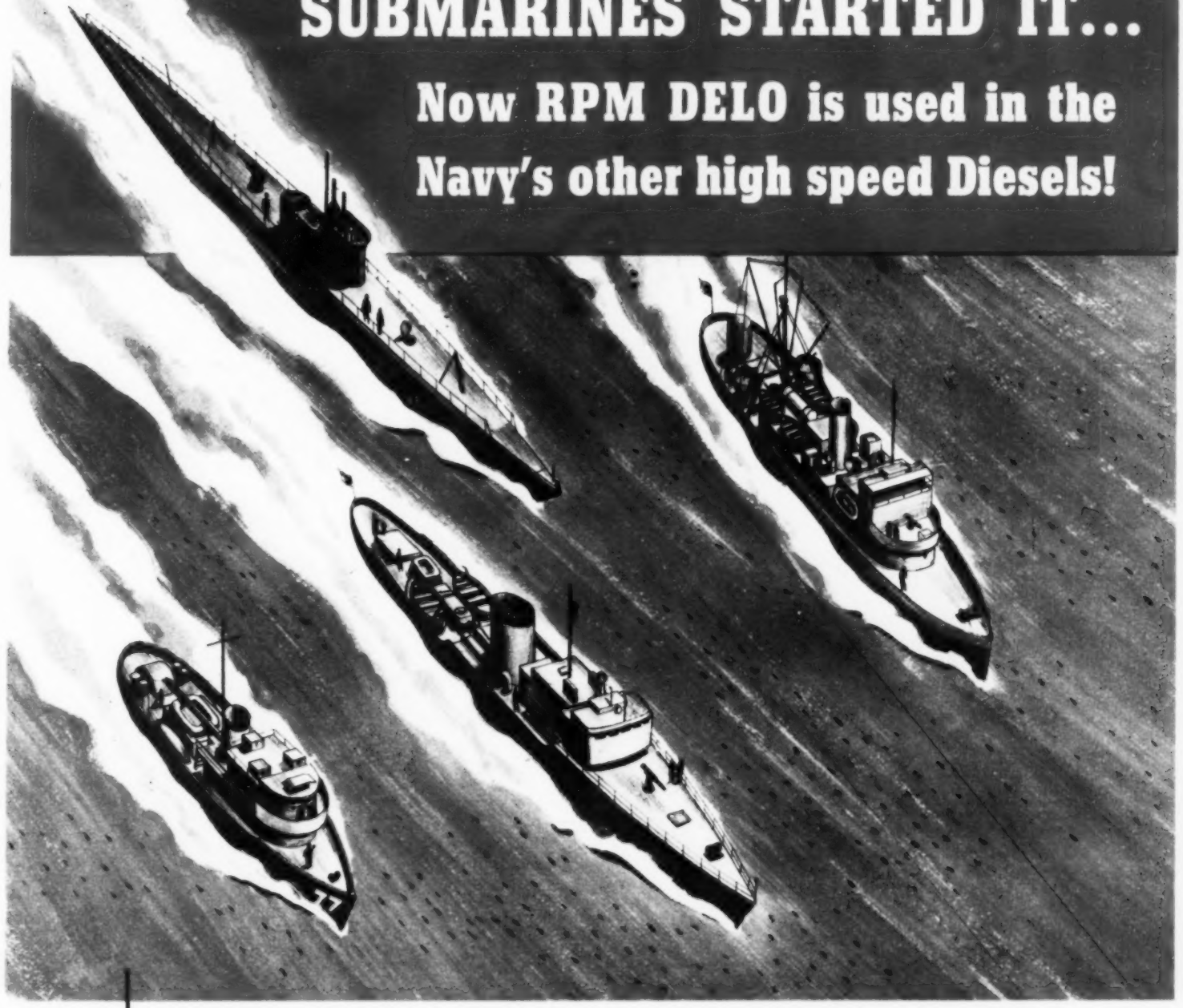
Natural porosity of sprayed metal gives it special advantages for bearings, both because the porous metal has a low coefficient of friction and because its absorption of oil makes it virtually self-lubricating.

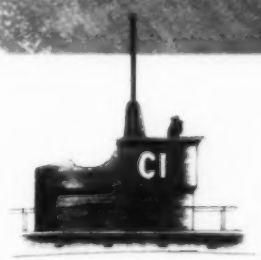
Although metallizing is a simple pro-

(Continued on page 106)

SUBMARINES STARTED IT...

Now RPM DELO is used in the Navy's other high speed Diesels!





RPM DELO was first used by the Navy in submarines. It performed so well that now the Navy uses RPM DELO to lubricate high-speed Diesels in submarines, mine sweepers, sub chasers and ocean-going tugs!

In these vessels, throughout the Seven Seas, RPM DELO is licking some of the toughest lubricating problems in the world. We're proud that it meets the Navy's exacting tests—we're glad no other nation has an oil of such quality to use in its ships.

RPM DELO will give *your* Diesels the same dependable protection the Navy demands. No other oil combines its anti-oxidant, cleaning and non-corrosive properties. It eliminates ring-sticking and sludge trouble, lengthens the time between overhauls. Switch *now* to RPM DELO, proved under the severest tests to be the world's finest Diesel lubricating oil.

STANDARD OIL COMPANY OF CALIFORNIA

RPM DELO is marketed under the following names:

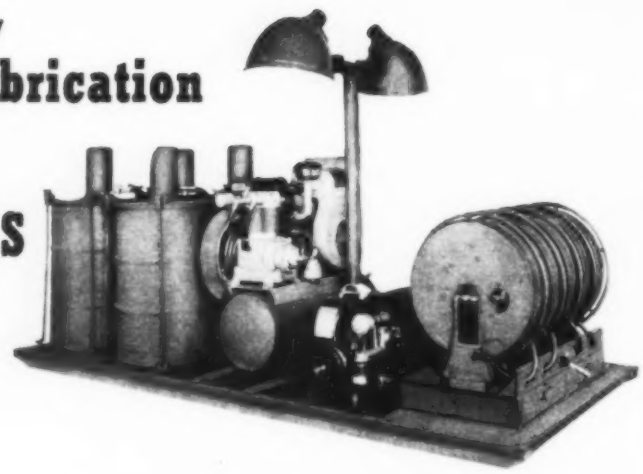
RPM DELO · Caltex RPM DELO · Kyso RPM DELO

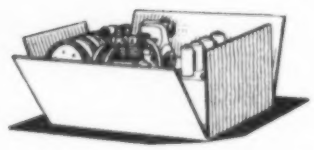
Signal RPM DELO · Imperial-RPM DELO CONCENTRATE · Sohio RPM DELO

RPM DELO

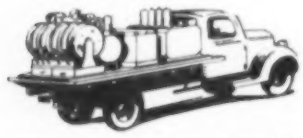
Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

For Quick, Sure, "On-the-Job" Lubrication Specify GRACO CONVOY LUBERS





Completely assembled and boxed in one crate, Convoy Lubers can be unpacked, mounted on a truck or trailer, loaded with lubricants, and operating in a matter of minutes.



Mounted on truck or trailer Convoy Lubers bring pressure lubrication to the job, save time and money with complete modern lubrication facilities, with every hand gun, tool, adapter, and accessory at the operator's finger tips.

When truck or trailer is needed for other work, the Convoy Luber can be removed intact and full speed operation continued from the bare ground or a suitable platform.

★ Graco Convoy Lubers, for complete lubrication of construction equipment ON-THE-JOB, include engine-driven air compressor, powerful pneumatic lubricant pumps dispensing from original containers, one 50-ft. air hose and four 30-ft. lubricant hoses mounted on reels, tool box, and complete tool and accessory kit. In addition, some models like that illustrated, include a 110-volt lighting plant and flood lamps for night operation. The complete unit is assembled at the factory on a heavy steel frame and shipped to you ready to operate.
Stop lubrication delays . . . write or wire for prices and details.

GRACO
GRAY COMPANY, INC.
Minneapolis, Minn.

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That is a profitable paradox for you. More true today than perhaps ever before. For here in the pages of this publication are packed many helpful ideas . . . considerable useful information. Much of it, in fact, available from no other source.

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(Continued from page 104)

cess that can be performed by relatively unskilled labor, there are certain definite procedures that must be observed if uniformly good results are to be obtained. Space does not permit going into detail in this regard, particularly as metallizing operation manuals are available at no charge.

Maintenance Jobs

Work for a metallizing outfit can come from almost every piece of construction equipment — from the largest pavers, excavators and tractors to the small pneumatic tools such as paving breakers, rock drills and clay diggers. Most of the large cement mills, for example, are using metallizing equipment for the maintenance of plant machinery, such as trunnion shafts, Bradley mill roll shafts, Jeffsen mill hammer shafts and other similar units that are subjected to heavy duty and severe wear. Quarry car axles, quarry locomotive axles, bucket loaders, dippers and all kinds of mobile equipment are regularly maintained insofar as worn bearing and press fit dimensions are concerned.

FOR CORROSION RESISTANCE. Interior of pump casting is sprayed with zinc by hand-held metallizing gun.

Maintenance of automotive equipment by metallizing is a common and well developed procedure which is effecting substantial savings in both time and labor in all parts of the country. These applications, common to the repair shops of transit companies and truck fleet owners, are applicable in every instance to heavy-duty trucks and tractors. Here are a representative few: Restoration of bearing press fits in wheel and axle hubs, bearing surfaces on clutch shaft and lever assemblies, crankshafts for gas and oil engines, crankshafts for air compressors, pinion shafts, universal joint crosses, brake camshafts, drive-

(Continued on page 108)

HOW AND WHY
WILLIAMS' TOOLS AID WAR PRODUCTION

J. H. WILLIAMS & CO., *Drop-Forgings and Drop-Forged Tools*, BUFFALO, N. Y.

WILLIAMS' "SUPERSOCKET" WRENCHES

Since *socket wrenches*, today, play an important part in the servicing as well as manufacture of mechanized war equipment, a general knowledge of standardized types is desirable. Williams' "Supersocket" Wrenches include 5 separate and distinct patterns of *standard drive* sockets, each with its full assortment of handles and parts. A brief description of each pattern follows, together with information on the type of service for which it is designed.

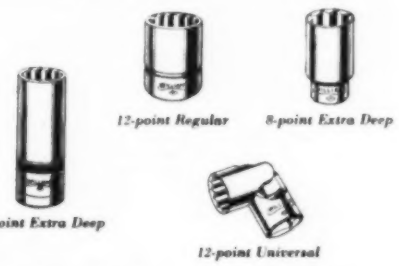
Midget Pattern

1/4" Square Drive.
Openings, 3/16" to 7/16"

Slim, straight wall sockets for electrical and all delicate adjustments. Ideal for magnetos, timers, generators, wiring connections, radios, carburetors, etc.

Bantam Pattern

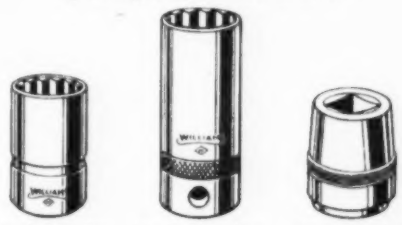
3/8" Square Drive.
Openings, 1/4" to 3/4"



Light, but strong, straight wall sockets with thin walls for use in close quarters. Universal sockets are fitted with spring tension to maintain desired operating angle. Recommended for aviation and general service.

Standard Pattern

1/2" Square Drive.
Openings, 7/16" to 1-1/4"



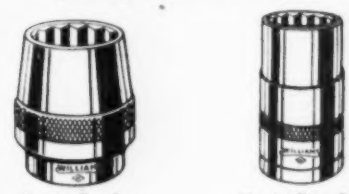
The 12-point sockets in this pattern have straight, thin walls. Those with square openings are the Taper Nose type. Extra Deep sockets have cross hole for use with a bar. Recommended for industrial and general service.

TYPICAL HANDLES & PARTS
(Standard Pattern Illustrated)

S10 & S15: Speeder Handles
S110P & S115P: Extensions
S50: Ratchet Handle
S57: Torque "Measurrench"
S51: Reversible Ratchet Handle
S40, S41 & S42: Flex Handles
S20A: Sliding T Handle
SH130: Adapter. S140: Univ. Joint

Heavy Duty Pattern

3/4" Square Drive.
Openings, 7/8" to 2-1/4"



Designed for harder service where more strength is required than on the "everyday" job, this pattern provides ample strength without clumsy bulk.

Extra Heavy Duty Pattern

1" Square Drive.
Openings, 1-1/16" to 2-3/4"

Ruggedly designed for the toughest kind of service. Sockets are all cross-drilled to receive sliding handle, which minimizes tendency of socket to "tip" under extreme leverage. "Lock-Socket" device eliminates danger of sockets being detached in service. Ideal for all extremely heavy work including tanks and other mechanical field equipment.

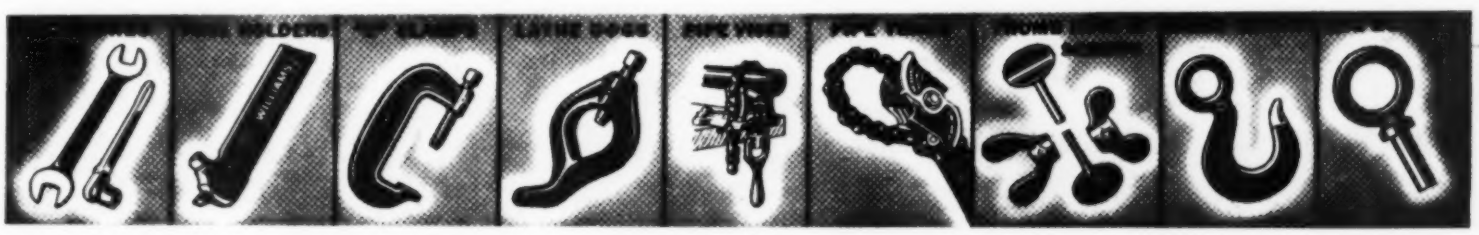
General Characteristics

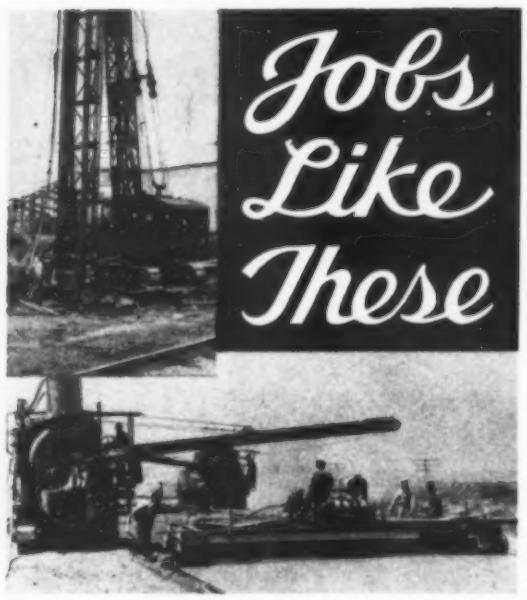
Speed and *Safety* are inherent socket wrench advantages. "Supersockets", with their innumerable combinations of handles, accessories and drive adapters, provide an extremely flexible wrench system that is speeding war production and the servicing of fighting equipment for land, sea and air.

Williams' "Supersockets" are sold singly and in complete Sets. Write for booklet, "How to Select and Use Wrenches."

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere

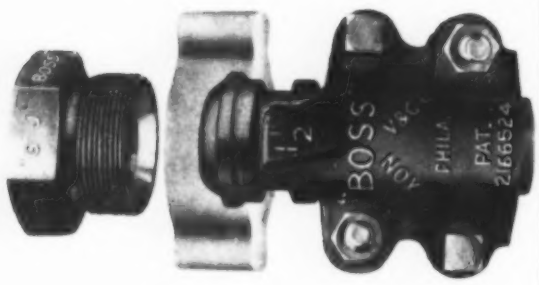




Run *Smoother* . . . With

"BOSS" HOSE COUPLINGS

For the STEAM, WATER and AIR CONNECTIONS



"GJ-BOSS" GROUND JOINT, STYLE X-34

A *washerless* coupling correctly designed and built to withstand the most rigorous conditions of service. Soft-to-hard metal seal formed by ground joint construction remains leakproof, regardless of wear or presence of abrasive particles. Strong malleable iron "BOSS" Interlocking Offset Clamp has tremendous gripping power and is proof against blow-offs. Swivel wing nut facilitates connecting and disconnecting. No mislaid or worn-out washers to replace. SIZES: ½" TO 4", INCLUSIVE.

"BOSS" WASHER TYPE, STYLE W-16

More widely used than any other industrial hose coupling. Identical in design, strength and gripping power with "GJ-BOSS" coupling described above, except that spud and stem head are made to accommodate washer which provides an effective seal against leaks and pressure losses. SIZES: ¼" TO 4", INCLUSIVE.

Carried by Manufacturers and Jobbers of Mechanical Rubber Goods.

DIXON
VALVE & COUPLING CO.
MAIN OFFICE AND FACTORY: PHILADELPHIA
BRANCHES: CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON

(Continued from page 108)

shaft yokes, transmission shafts and brake piston shafts.

Types of Wire

Material used for metallizing is in the form of wire which is made, annealed, drawn and coiled to exacting specifications. As in welding, where the right rod for the job is a prime necessity, so in metallizing the proper wire for the work is of first importance. Low, medium, and high carbon steels, tested in service over many years, are available and should be used where indicated.

Finishing Surfaces

Finishing of treated surfaces, either by turning or by grinding, presents no difficulty; in most cases even the high carbon steels can be machined with Carboloy or a similar material.

By the metallizing process, many jobs can be done without completely dismantling a heavy piece of equipment. The Fairmont roll crusher shaft shown in accompanying photographs is an excellent illustration of how an enormous dismantling and re-assembly job can frequently be avoided; this shaft was repaired and restored to operation in less than a day.

Priority Data, Aug. 18, 1942

Metallizing equipment, i.e., the gun itself and accessories, is available on a three week delivery basis. The execution of a PD-1A form requesting a priority usually results in the prompt issuance of a rating on which shipment can be made.

Purchasers operating on War contracts assigned priority ratings on PD 3-A certificates can often quickly obtain equipment on the extension of their own ratings by the issuance of a new PD 3-A certificate to cover the metallizing equipment.

Supplies such as wire will vary somewhat but an A-10 maintenance and repair rating is usually sufficient for all but the following, which require an A-l-K or higher rating: 1. Stainless steels (Metcoloy #1 and #2) and 2. copper and copper alloys (Sprabronze, Sprabrass). Present shipments of aluminum wire are limited to A-1-A orders.

Cost of Metallizing Repairs

To give an approximate idea of the cost of making on-the-job repairs by metallizing, assume there are three shafts of different sizes and with different sections to be resurfaced.

The metal used is Sprasteel 10 which, in 100-lb. quantities costs 11¢ per lb. After including labor at approximately 85¢ per hr., oxygen at $1.00 per 100 cu.ft., acetylene at $2.50 per 100 cu.ft. and air at 10¢ per 1,000 cu.ft., we have a cost per pound actually sprayed of 29¢. This figure is exclusive of overhead, burden and profit, and does not include any preparation of the part, or finish machining.

Job No. 1 is a shaft 1½ in. in diameter, to be metallized over a length of 2 in. A thickness of 1/16 in. of metal is to be applied to the radius. A total of ¾ lb. of metal will be required.

Job No. 2 is a shaft 2½ in. in diameter to be metallized over a length of 4 in. A thickness of 1/16 in. of metal is to be applied to the radius. A total of 1.75 lb. of metal will be required.

Job No. 3 is a shaft 4 in. in diameter to be metallized over a length of 6 in. A thickness of 1/16 in. of metal to be applied to the radius will call for 2.6 lb. of metal.

Eight pounds of Sprasteel 10 can be sprayed per hour. It will be seen, therefore, that the actual spraying time on any of the above examples is negligible.

Machining time, preparation and finishing cannot be estimated, as facilities and conditions vary with every job.

★ ★ ★

Trenchers Dig Florida Rock for Key West Aqueduct

(Continued from page 65)

up to 42 in. wide and 8½ ft. deep have been excavating earth, marsh muck and blasted coral rock for the 128-mi. aqueduct on the mainland and the keys. Although the trenchers can dig unblasted coral rock, the work is a tedious, grinding operation, and construction of the pipe line has been greatly expedited by drilling and blasting ahead of the excavators. Of the two trenchers, one machine (rented from South Dade Farms, Homestead, Fla.) is permanently equipped with broad wooden crawler treads and wide wooden front wheel tires to travel over soft, marshy soil prevalent in South Florida.

Cost of the new aqueduct will come to about $3,375,000. One-third of this amount is supplied by the state-appointed Key West Aqueduct Commission out of the proceeds of the sale of $1,500,000 of its bonds to the RFC; the rest of the cost is paid by the Navy. Lt. Comdr. A. J. Fay (CEC) U.S.N., public works officer, exercises general supervision over the project, and Lieut. W. L. Sawyer (CEC) U.S.N.R., is resident officer in charge of construction. Parsons, Klapp, Brinckerhoff & Douglas, New York City, are engineers for the Navy; Elson T. Killam acts as consultant to this engineering firm and to the Key West Aqueduct Commission.

We Sell All Types . . . We Recommend Only Prefabricated Ties . . . They Cost Less!

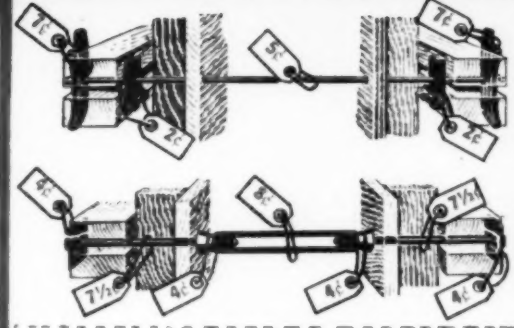
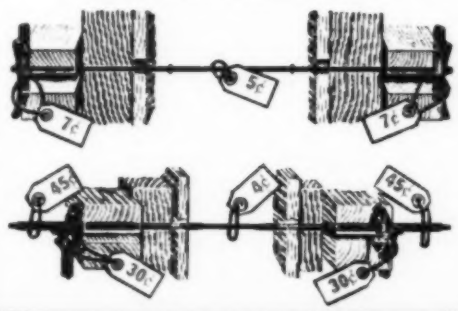


Figure it for yourself!
HERE ARE THE PRICES*

ALL PRICES F.O.B. BROOKLYN, N.Y.
*BASED ON A 12" CONCRETE WALL



CLANK! CLANK! CLANK!

THE TANKS ARE MARCHING!

Way back where glowing steel billets bloom, is the starting place for that "Big Parade" of tanks, so essential to our National Victory. Could be, that monster you see in the picture is made of steel saved by some builder or contractor, who abandoned, the wasteful practice of using "make-shift", "home-made" wire, band or rod ties, and turned to Richmond's complete line of more than 85 different prefabricated devices specifically engineered to meet every concrete form-tying need. For, you see—

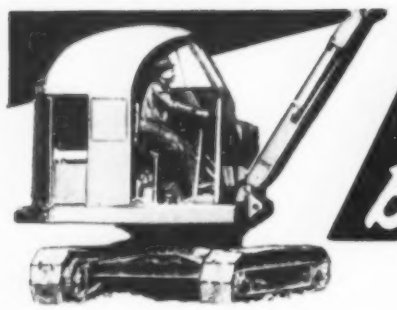
Richmond Makes 1 Ton of Steel Do the Work of 3 Tons

—and that's not all! The "Richmond Way" is the profit making way on any sort of concrete job, because it gives you advantages available nowhere else. Advantages that mean a better, faster job at less cost and with greater profit. *For instance*, Richmond form-tys help you erect and strip your forms in less time. *For instance*, from our technical and estimating service you get, without cost, a job plan showing the number and location markings of the ties needed for each section. *For instance*, you do not tie up your funds in working parts such as Tylags, Tycones, Flat Washers, Tywrenches, etc. Richmond loans them to you! We're not just selling products or devices. From Richmond you get a service, a method, a way by which you can make many an unexpected dollar—and gain a name for contributing vitally to the "stock-piles" of steel for armaments. Specific figures to back-up all these statements are yours for the asking.

RICHMOND SCREW ANCHOR CO., INC.

816-838 LIBERTY AVENUE • BROOKLYN, N.Y.

TIME AND LABOR SAVING CONSTRUCTION DEVICES FOR CONCRETE



WELDED

ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED

BULLDOG GRIP

● There is tremendous closing power in Williams Buckets That's why they bite so deeply and cleanly in hardpan digging, or work so proficiently in clearing rubble, lifting rocks or slabs of concrete.

Williams Buckets are "built to last and move dirt fast" All-welded construction at vital points imparts greater strength while eliminating excess weight; only riveted at sections which may ultimately require replacement. Another important exclusive feature of the Williams bucket, illustrated in action, is straight line reeving that reduces wear and prolongs cable life.

Many definite reasons why your next bucket should be a Williams are found in the individual bulletins completely describing each type of Williams Bucket. Sent free on request.

THE WELLMAN ENGINEERING CO.
7017 Central Avenue, Cleveland, Ohio
Distributors in all parts of the country

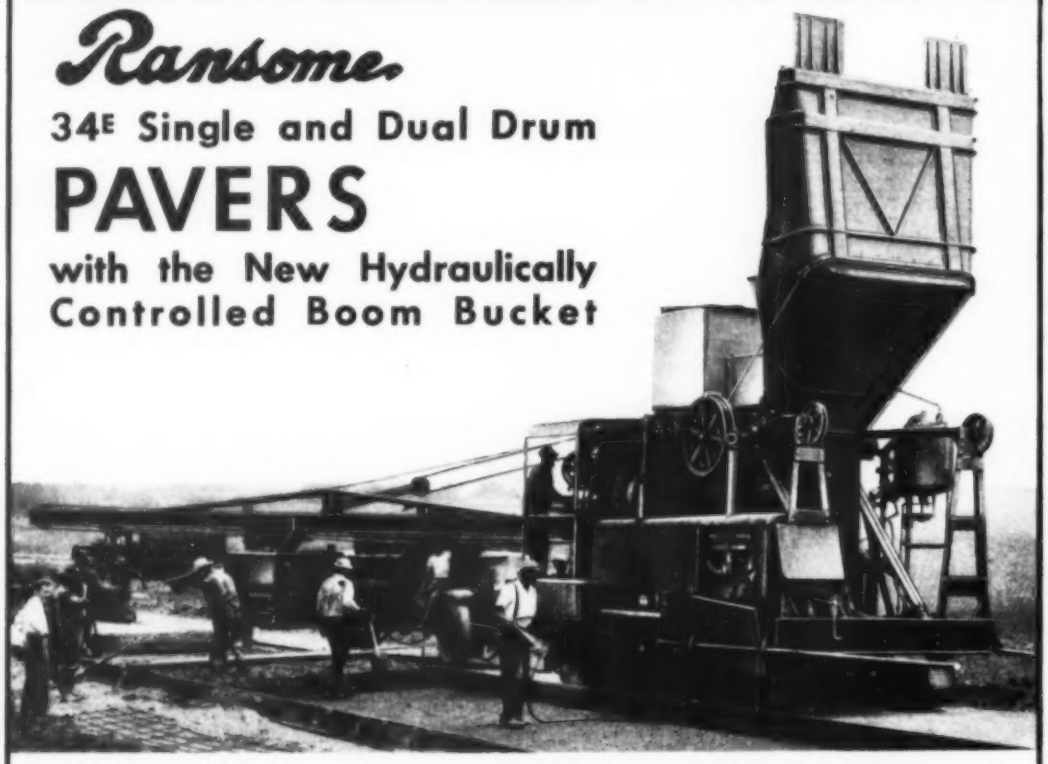
WILLIAMS *Buckets*
built by **WELLMAN**

Ransome

34E Single and Dual Drum

PAVERS

with the New Hydraulically Controlled Boom Bucket



- Eliminates split batches.
- Can discharge small portions of concrete, close doors and move boom to other locations.
- Saves time of bucket travel for split batches.
- Doors open or close to any degree at any position on the boom.

RANSOME MACHINERY COMPANY
Dunellen New Jersey

Sabotage Protection

Given by Concrete Masonry Wall Units

(Continued from page 46)

been made of hollow concrete masonry units for protection against sabotage of electric transformers, switching stations and power generating stations. For this type wall many physical advantages and costs less than for sandbag walls are claimed.

Masonry Wall Tests

Several tests have recently been made in different parts of the country to determine how effective concrete masonry walls are in providing protection against highpowered rifle fire, which simulates action of bomb splinters. Garands, Springfields, service pistols and machine guns were used in these field tests. This assorted fire power was directed against concrete masonry walls 12 in. thick, built up of hollow units and with the core spaces filled with sand. Maximum penetration of the bullets was 10 in., and in no case did bullets pierce the opposite face of the shell of the units even when firing was concentrated to the extent of five shots within a 3-in. circle. Walls 8 in. thick built up of solid masonry units gave equal protection.

Wall Construction

Walls may be laid up either with or without mortar, according to the Portland Cement Association, which offers the following recommendations: To provide adequate stability for walls 12 in. thick up to 14 ft. in height, when laid up without mortar, care must be taken in providing pilasters and extra strength at corners. The wall above grade, including pilasters and strengthened corners, will require 122 units per 100 sq. ft. and 1¾ cu. yd. of sand for filling the core spaces. If mortar is used in laying up the walls, 5 cu. ft. will be required per 100 sq. ft. of wall.

To insure stability of the wall, masonry units should rest on adequate footings. Where soil bearing power is high, footings may be built of hollow 12-in. units 16 in. long. These are placed in the footing trench at right angles to the direction of the wall. This forms a footing of adequate strength when the core spaces are filled with a cement mortar composed of 1 part of portland cement to 3 or 4 parts of sand. It will require 1¼ cu. yd. of mortar per 100 lin. ft. of wall, using 10 to 12 sacks of cement.

If soil conditions do not permit this type of footing, masonry units should rest on a footing of standard plain con-

(Continued on page 112)

Rhode Island paves with both types

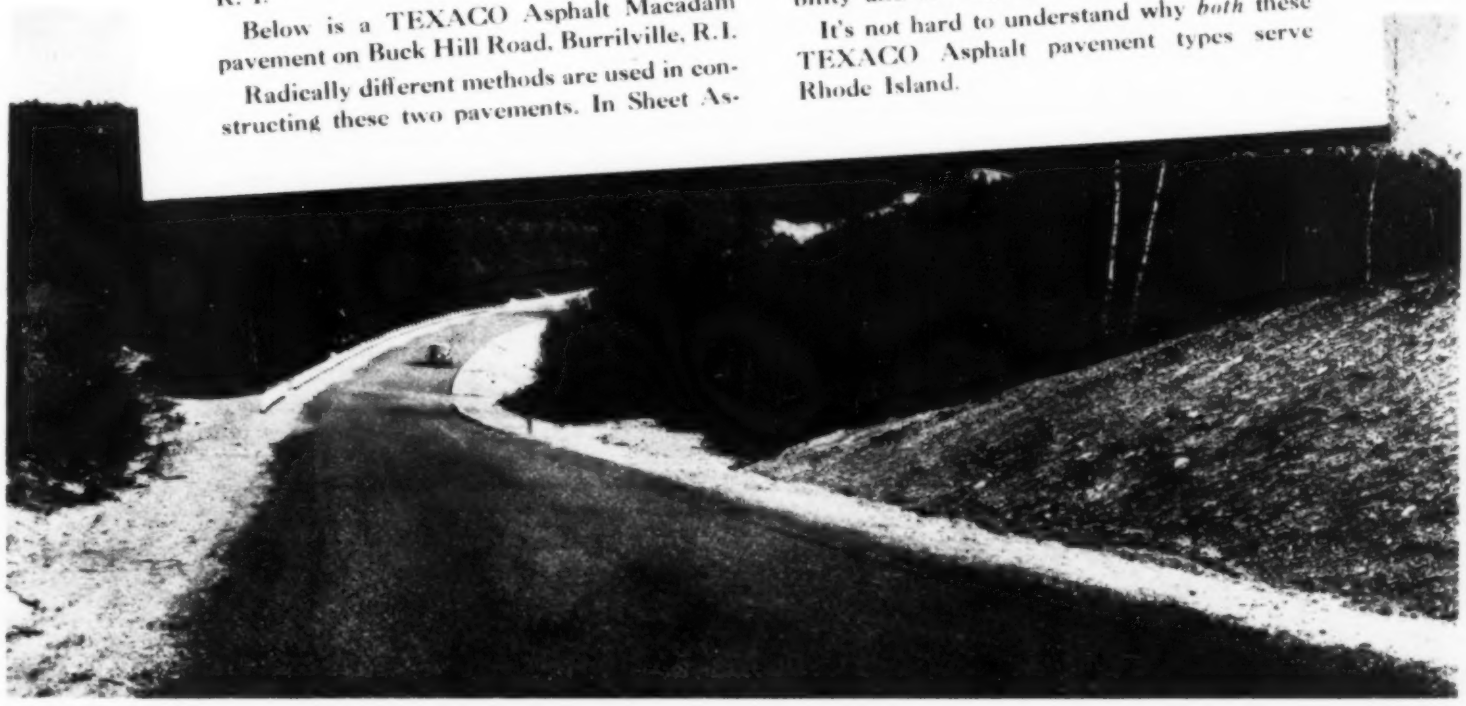
Above is a TEXACO Sheet Asphalt pavement on Pawtucket Avenue, East Providence, R. I.

Below is a TEXACO Asphalt Macadam pavement on Buck Hill Road, Burrilville, R.I.

Radically different methods are used in constructing these two pavements. In Sheet Asphalt, aggregate and asphalt are scientifically plant-mixed. In Asphalt Macadam, asphalt is forced into the pavement by pressure distributor.

But, despite the wide difference in construction methods, the two pavements have certain important qualities in common . . . freedom from joints . . . imperviousness to moisture . . . low susceptibility to temperature change . . . all of which add up to exceptional durability and low upkeep cost.

It's not hard to understand why *both* these TEXACO Asphalt pavement types serve Rhode Island.



THE TEXAS COMPANY, Asphalt Sales Department,
135 East 42nd Street, New York City

Boston Philadelphia Richmond Chicago Jacksonville Houston

TEXACO REG. T. M.

TEXACO ASPHALT

Saw and Save Time WITH MODEL 825 SKILSAW!

A GREAT ALL-AROUND SAW...A GREAT SAW "BUY"

AT ONLY $119.00

Wherever war contracts are finished *fastest* you'll find Model "825" SKILSAW cutting wood, metals, stone and compositions. This fast-cutting saw does 90% OF ALL SAWING ON WAR CONSTRUCTION . . . cuts 2⅝ in. deep and bevel-cuts 2 in. dressed *or rough* lumber at 45°. Yet Model "825" costs very little more than an ordinary 7 inch saw . . . and it handles as easily because it's only 18 in. long, weighs only 18½ lbs.

Ask your distributor to demonstrate Model "825" SKILSAW today. When you get it in your hands, you'll agree with war contractors everywhere that here's a great all-around saw and a GREAT SAW BUY!

SKILSAW, INC.
5045 ELSTON AVE., CHICAGO
New York • Boston • Buffalo • Philadelphia • Cleveland
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New Orleans • Dallas • Los Angeles • Oakland • Seattle
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SKILSAW PORTABLE ELECTRIC TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

crete 8 in. thick and from 16 to 20 in. wide.

Several utility companies already have built concrete masonry walls around transformers and other installations vulnerable to sabotage.

★ ★ ★

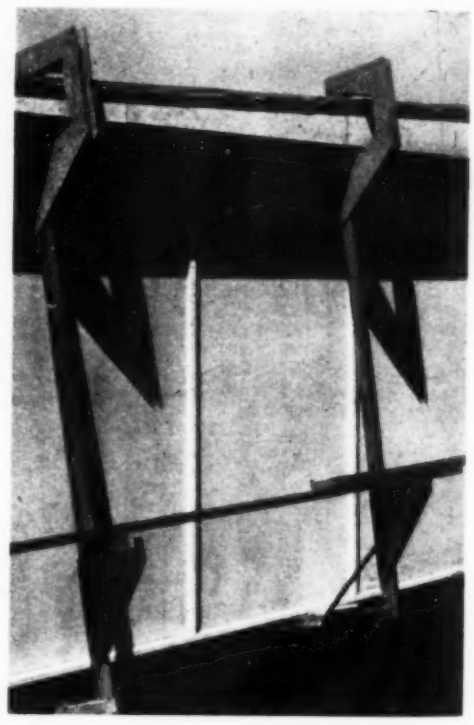
Contractor Builds For Shipyards Workers

40 Houses a Day

(Continued from page 50)

a 1¼x1½-mi. area of rolling hills ranging from near sea level to elevations of several hundred feet. The houses are laid out in groups of four, each structure as a separate detached unit with a minimum of 2-ft. space as a fire-break between adjoining houses.

In staking out the house locations pegs were driven at the center point for each foundation pier. At these pegs holes were bored by a 30-in. auger in



PAINTERS' SCAFFOLD for outside walls used large hooks made of scrap plywood designed to fit around eaves projection.

lieu of "excavation for foundations." These holes are put down only about 16 in. and the 30-in. diameter gave ample space for adjustment in final exact alignment of the piers. A few spade fulls of fine crushed rock were thrown in the bottom of each hole to provide

a stable base on which to level up each pier. The auger was driven by a Buda engine mounted on a truck and operated by a two-man crew. This crew averaged 212 holes per 8-hr. shift.

Precast Concrete Piers

Concrete piers, which were precast at the casting yard and delivered to the site by truck, are 16 in. square on the bottom, 9 in. square on top and 16 in. high. They were made of light-weight aggregate which averaged about half

WALL PANELS THAT REQUIRE PAINT on both sides are sprayed by painters working on opposite sides of panel in spray booth. This painting was done while panel moved slowly through on conveyor supporting panel in vertical position.

the usual concrete weight, each pier weighing about 165 lb. Each one has imbedded in it a steel T-iron projecting about 5 in. from the top of the concrete. This serves as a center to hold the 8x8x2-in. Redwood sill in place and also as a dowel for the 4x6-in. posts that support the floor system. From 14 to 16 piers were used per house. Four-by-eight floor beams are surmounted by 3x 10-in. joists that serve as a framework carrying the 4x8-ft. prefabricated floor panels. The panels rest on nailing strips spiked to the 3x10's on the inner side at a level such that the top of the floor panel will come flush with the top of the 3x10.

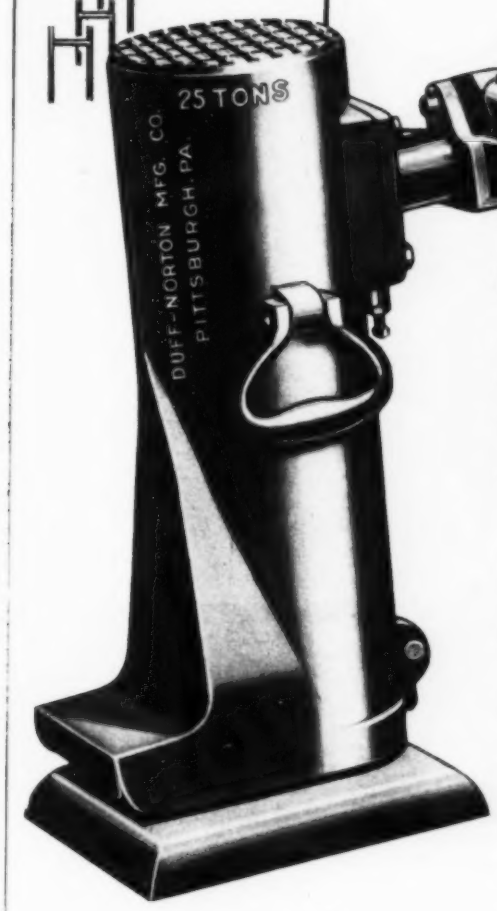
It was found advisable to use 12-gage plumber's tape to bind the corners of the 3x10's, putting two 10d. spikes in each of the abutting timbers, to

(Continued on page 114)

WHEREVER YOU FIND . . . CONSTRUCTION

YOU'LL FIND

DUFF-NORTON JACKS!



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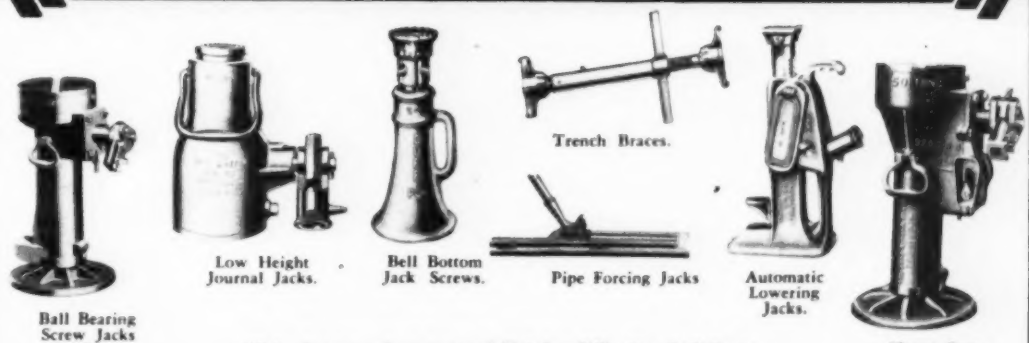
SPEEDY & EFFICIENT

SAFE & DEPENDABLE

EVERYWHERE throughout the construction field you'll find DUFF-NORTON Jacks lifting, lowering and holding heavy loads; pushing, pulling and forcing members, etc.—safely, dependably, efficiently. Many types and sizes are designed for a multitude of engineering and construction jobs.

You can trust Duff-Norton Jacks for every job of lifting, lowering, pushing or pulling. Specify Duff-Norton Jacks and you will always have the best, safest and most dependable jacks.

A FEW OF THE MANY TYPES AND SIZES


Ball Bearing Screw Jacks for Extra Heavy Duty.
Low Height Journal Jacks.
Bell Bottom Jack Screws.
Trench Braces.
Pipe Forcing Jacks
Automatic Lowering Jacks.
Heavy Duty Screw Jacks.

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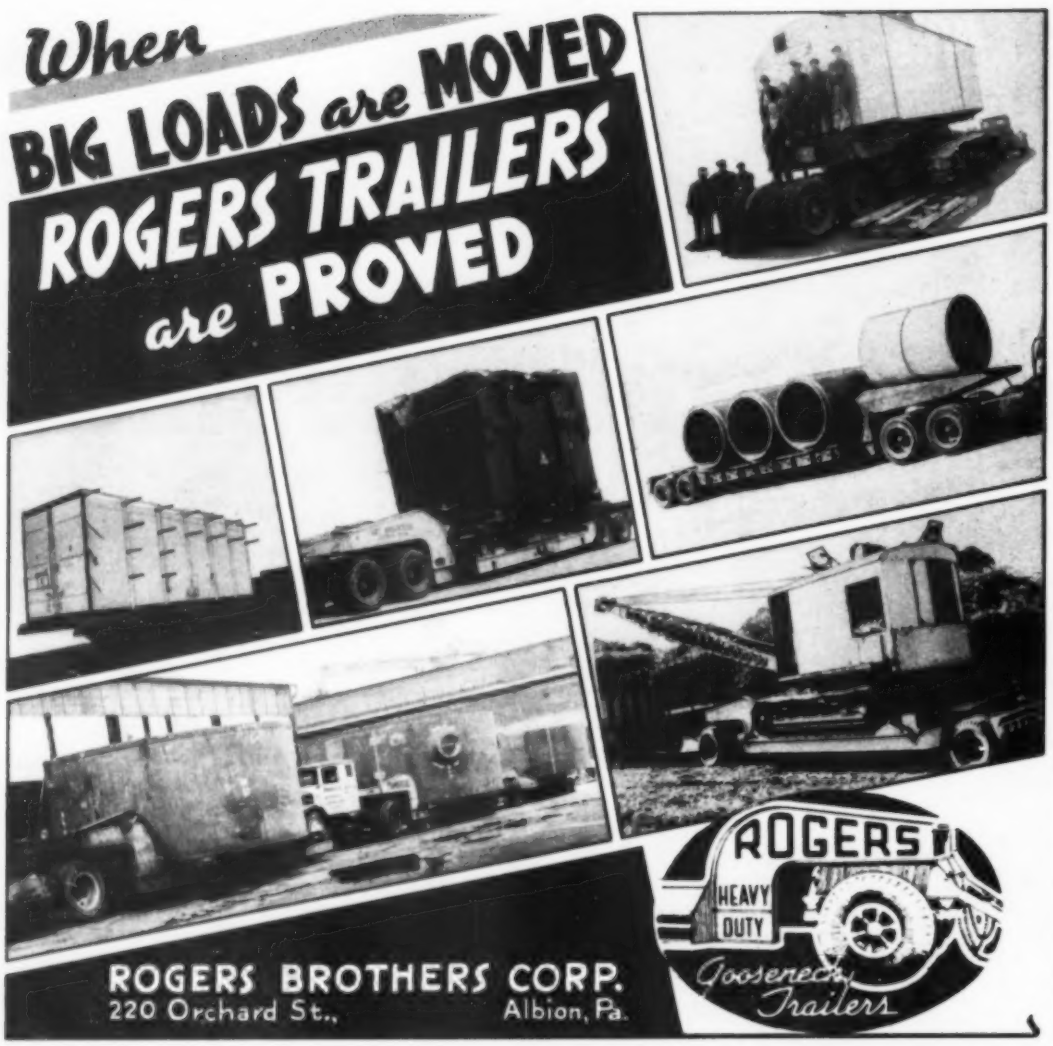
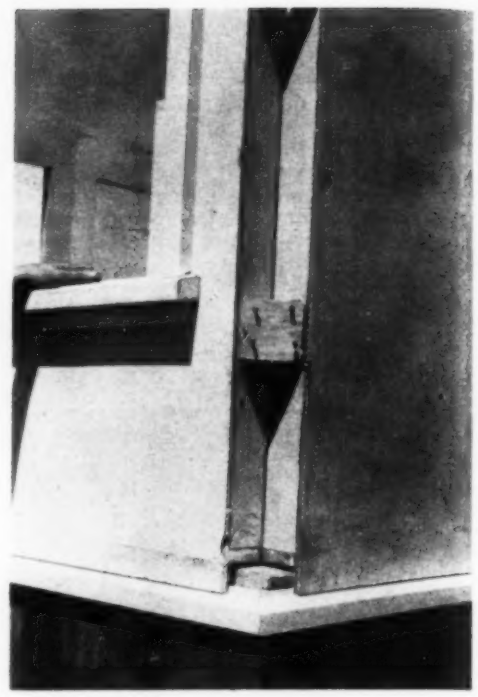
Representatives in Principal Cities

When BIG LOADS are MOVED ROGERS TRAILERS are PROVED



ROGERS BROTHERS CORP.
220 Orchard St., Albion, Pa.



AT BUILDING CORNERS adjacent panels are fastened together with plywood fillets in which double-headed nails are used to facilitate later dismantling. Note how plywood projects at panel ends to provide means of screwing plywood to 2x3 sill spiked to floor panel. Outside plywood (⅜ in.) is weatherproofed and rests on water table overhanging rough Redwood boarding used below floor level.

(Continued from page 113)

strengthen the frame during the time floor panels were being placed. After floor panels were set in place they were fastened to the 3x10's by ½-in. bolts. A pair of these was put in on the sides of panels that parallel a 3x10. The holes for these bolts were bored after the panels had been set in place, using electrically powered drills. To provide a convenient source of power for these drills and also for trimming and ripping the 1-in. boards below floor level, a 5-kw. generator driven by a Ford engine was mounted on a truck and moved about the job as required. This rig, a very handy outfit, had four plugs at the rear of the truck to which long extension cords were attached. Frequently it was used for operating two drills and two Skilsaws.

Wall and Roof Panels

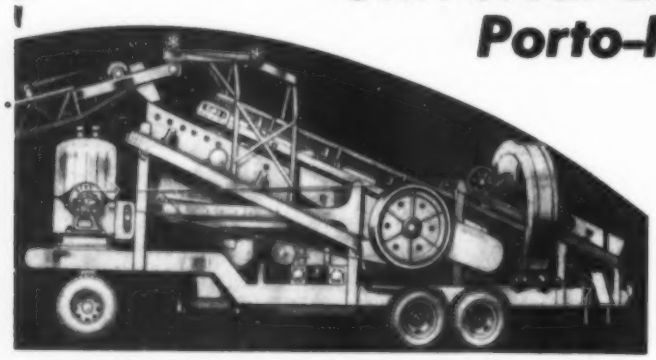
On top of the completed floor, the outline of the walls, to be carried up in prefabricated wall panels, is laid out in 2x3's spiked to the floor. The wall panels are set up on these 2x3's and are fastened to them by screws on 18-in. centers. Joints between panels are made by screws on 2-ft. centers fastening the projecting plywood at the edge of each panel into a spline that is common to two adjoining panels. At the corners small plywood fillets are used with double-headed nails, to fasten adjoining panels.

As each roof panel is laid in place, supported on wall panels, it is followed by a rafter which serves as the spline

(Continued on page 116)

You Win All the "Chips" with the Universal 27-G Porto-Plant!

The Efficient Screen Unit!
Double Deck Auxiliary Vibrating Screen shakes out chips which are conveyed to truck or stock pile—balance of crushed material is conveyed to main screen over mixing hopper.



When there's a big demand for chips for seal coating airports and roads – and there's a lot of it being done these days – the 27-G gives you the winning cards.

A Western state road commission* reported:

"We purchased a Universal 27-G Portable Gravel Plant in May, 1941, and our experience with it has been very favorable compared to similar size plants of other makes operating in this territory. The production capacity of the Universal seems much higher. *On a 5-day test run, July 1st to 5th, production of chips alone averaged 210 yards per 8 hours.* This is exceptional capacity and we can highly recommend this plant for highway work."

This bonafide letter from our files was passed on to us by a prospective purchaser who inquired of this user what they thought of their 27-G. Every contractor, pit owner and highway commission using them has similar praise for them! Send for Specification Sheet 27-G detailing the 4 sizes.
**Name on request.*

UNIVERSAL CRUSHER COMPANY
327 Eighth St. West, Cedar Rapids, Iowa

UNIVERSAL
CRUSHERS PULVERIZERS COMPLETE PLANTS SPREADEROLLERS PORTABLE ASPHALT PLANTS

Yes, and IN UNIFORM

Since 1846, Hazard wire ropes have been famous for their uniformity—foot by foot, reel by reel. Uniform dependability is one of the big reasons why we have customers coming back for Hazard ropes, *continuously*, for 30, 40 and 50 years.

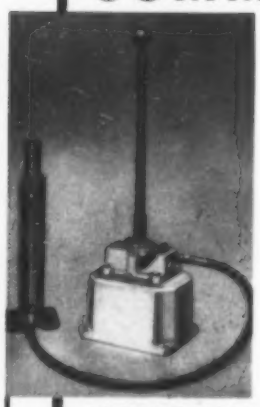
Today Hazard lines are not only uniform in quality but they are *in the uniform* of war work. They are being used for mine sweepers, torpedo nets, tethers for observation balloons, balloon barrage ropes, airplane controls, ship rigging, hoist ropes for lifting aerial bombs into place in bombers, winch ropes for Army motor trucks and tractors, ropes for airplanes and artillery, glider tows, parachute flares, parachute rip cords, firing controls on tanks and heavy gun mounts, shipyard crane ropes, etc., etc. Much of this rope is **HAZARD LAY-SET** Preformed Green Strand—the rope that lasts longer because it is free from internal stress. It is also easier and safer to handle, resists kinking, whipping or rotating in sheave grooves. Some of the rope is **HAZARD "NONPAREIL"**—the rope that represents 96 years of wire rope-making experience, known to "old timers" as well as the younger operators as the line that gets the job done efficiently and economically.

HAZARD WIRE ROPE DIVISION Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC., BRIDGEPORT, CONNECTICUT

HAZARD LAY-SET Preformed WIRE ROPE

COMMERCIAL



OFFERS YOU *FLEXIBLE, PORTABLE* LIFTING POWER with this HYDRAULIC EQUIPMENT

● COMMERCIAL Hydraulic Equipment consists of self-contained, double acting pumps which are coupled with rams rated up to 4000 lbs. lifting capacity. They can be used anywhere, in any position, as the power is hand activated. Few moving parts mean little or no maintenance. These COMMERCIAL units are ideal for the swift, economic, efficient handling of operations that demand lifting or jacking. Want details on sizes, types and prices? Write!

THE COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN OHIO

ARMSTRONG

DROP FORGED WRENCHES

In construction work there's no telling what strain a wrench may be subjected to, that's where it pays to invest on ARMSTRONG Drop Forged Wrenches — the wrenches with a wide margin of *extra strength*.

Improved in design, drop forged from special carbon steels, heat treated, hardened, tempered to the correct point of stiffness and toughness, they make work easier, faster and safer. Over 100 types, including Carbon and Alloy Steel Construction and Structural Wrenches and Ratchets. Each type in *all* sizes.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. Francisco Ave., Chicago, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York

(Continued from page 114)

between adjoining pairs of roof panels. This rafter is screwed in place under the overhang of the first panel and then the adjoining panel is put on and the projecting plywood edge is similarly fastened.

As a tie-down for anchoring walls to foundation, 12-gage plumber's tape was

PENDING PLACEMENT OF FLOOR PANELS 3x10-in. framing is held at corners with 12-gage plumber's strap nailed to both timbers.

run from the plate, at the top of the panels, to the floor timbers at all corners and at partition intersections.

Roofing proper consisted of two coats of 15-lb. Pioneer roofing compound, mopped on hot over the plywood top of the roof panel, and finally a layer of 90-lb. Pioneer mineral surface roofing, also fastened down with a hot mop-coating.

"Victory" Bathtubs

When it appeared that the lack of bathtubs would prevent completion of the houses, it was decided to build these tubs on the job making a frame of concrete reinforced with stucco mesh wire and lined on the inside with glazed tile. The design was called McCarthy's victory bathtub and a plant was set up on the project capable of turning out 40 per day.

The tub was cast in an inverted position around a form or mandrel to which the tiles had first been fastened with paste, the glazed inner surface of the tile being pasted to the mandrel. A brush coat of neat cement was applied to the rear surface of the tiles to improve bond with the concrete and then, after putting in stucco mesh reinforcing, the form was filled with concrete. The concrete was thoroughly vibrated and struck off on the top with a straight edge. This "top" became the bottom when the tub was turned over into nor-

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Floodlights

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A NECESSITY NOW

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FOR ALL PURPOSES WHERE FLOODLIGHTS ARE REQUIRED.

Simple In Construction
Economical In Cost
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get the facts—experience—data you need to solve your particular problems from

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mal position. Concrete for the forms was delivered in wheelbarrows from a mixer, up an incline to a runway just above the level of the casting floor. The use of light weight aggregate made it possible to keep the weight of the tub down to about 250 lb., half what it would have been with a standard concrete mix.

The tubs were allowed to remain in the inverted position on the forms for about 3 days and then were lifted off, turned right side up and Golco white waterproof grout was worked into the joints to make a neat and thoroughly watertight job.

The architectural work on the entire project was done by Franklin & Kump, and William Wilson Wurster, associated architects. The general contract for $2,000,000 was held by Robert McCarthy, of San Francisco, for whom Edward Manning was general foreman. Subcontracts were as follows: Electrical work, Dauherty Electrical Co.; plumbing, Herman Lawson & Co.; painting, Eckstrom Painting Service; and bathtubs, Mills and Hinz Tile Co.

★ ★ ★

How London Repairs *Bombed Gas Mains*

(Continued from page 47)

a gas repair party and other incidents which are not so urgent and can safely wait until daybreak.

The following is an extract from a sheet of notes issued to air-raid wardens:

When and What to Report

The Gas Company — like you and everybody else — has its hands full during a heavy raid. If you summon a party unnecessarily it may cause more important incidents to be held up.

The following types of incident call for the immediate attention of a gas repair party:

(1) Where a gas main in the street is broken and on fire or is broken and there is a strong odor of gas in the crater, the company should be notified, with a request for immediate attention.

(2) Where there is a flooded crater in the road the company should be notified so that immediate action can be taken to prevent extensive flooding of the gas mains. It should

(Continued on page 120)

Every Hose Here is a Vital Link
...Not a Length Can be Spared!

Above you see WATER HOSE feeding the boiler of a pile driver, and wetting the concrete mix . . . SUCTION HOSE removing water from the concrete forms . . . STEAM HAMMER HOSE driving the piles to bed rock. Jobs like this show how indispensable are the rubber sinews of construction—and the importance of following your rubber salesman's recommendations for storing and handling. Write to us to put you on our list for a series of Conservation Tip Sheets. You can have any quantity for your Bulletin Boards, key men, etc.

And when you are finally faced with a rubber replacement problem, it is best to buy highest quality goods . . . To you, this should mean —

GOODALL "DURATION QUALITY" PRODUCTS

. . . hose, belting, boots and clothing . . . *engineered to last longer* than regular standardized emergency products. GOODALL research laboratories are "building bricks out of straw" these days . . . developing new constructions that are the envy of the industry.

Generally, each GOODALL DURATION BRAND has the same relative merits as its equivalent in our pre-war line, and can be used with confidence for the same services formerly recommended.

CONCRETE PLACING HOSE

GOODALL sold the inventor of the first Concrete Placing Machine the first length of hose ever used for this service. Naturally, as pressures and volume were improved down through the years, Goodall's Concrete Placing Hose was refined to give the maximum service. Today, Duration Style—S-69 uses less of the vital raw materials that went into our Style S-51, but Goodall is still your best investment for concrete placing.

THIS TAG goes with every length of Goodall Concrete Placing Hose as a reminder of the advisability of turning the hose to prolong its life and conserve rubber.

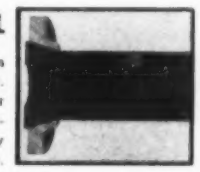
To get the longest wear out of material hose of this nature a lot of attention should be given to the way it lies, so that the inside of the hose may wear evenly all around.

Years ago, Goodall gave you the added advantage of white numerals, 1 to 4, around the outside of the hose. Careful users can thus give the hose a quarter turn periodically and keep track of the inside wear. These days it is wise to straighten out all unnecessary bends to eliminate inside abrasion wherever possible. Also, you should reverse your lengths of hose end to end occasionally, because pressure is greatest near the machine.

Care in coiling, carrying, and storing concrete placing hose calls for the same rules as apply to lighter, less costly hose. At any sign of external damage immediate steps should be taken to correct it.

MAIN OFFICE—36th and Market Streets, Philadelphia
Branches — New York — Boston — Pittsburgh — Chicago
GOODALL RUBBER CO. OF CALIF.
GOODALL RUBBER CO. OF TEXAS
FACTORY — TRENTON, N. J. — EST. 1870
72 Years of "Know How"—Our Most Valuable Commodity

HERE'S HOW TO SAVE METAL



Specify Goodall's "Flang-Lok" Ends on your concrete placing hose. (U. S. Pat. No. 1883086). No metal shanks or clamps. Just a set of split collars. Easiest hook-up ever devised for regularly turning the hose and lining up bolt holes.

GOODALL
RUBBER COMPANY INCORPORATED

Speeding Victory

Barber

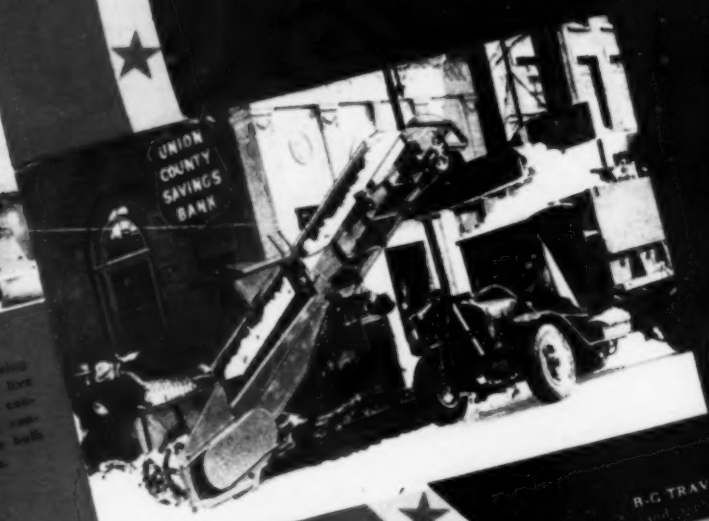
THESE machines are the products of free enterprise, developed in times of peace for normal functions. They are typical of the many ingenious results of the open competition of a democratic system. Now these very machines are working to defend the system that made them possible.

There is much more to defense than munitions . . . the building of camps, airports, roads, igloos

BARBER-GREENE COMPANY

B-G FINISHER [illegible] The B-G Finisher receives the asphalt m/x from trucks, evenly spreads it, compacts it to a uniform density, and automatically lays a level surface even over an irregular sub-base.

B-G PORTABLE CONVEYOR [illegible] shells will be stored. This same conveyor is also used for handling concrete, aggregate, and many other bulk materials of the Defense program.



B-G SNOW LOADER [illegible]

B-G TRAVEL PLANT [illegible]

B-G "GOOSENECK" COAL LOADER. [illegible] road and rail cars for loading hangars and airport offices both in the United States and Canada.

B-G CAR UNLOADER. [illegible] U. S. Quartermaster Corps. This Barber-Greene unit under the car and is practically automatic after being started.

"Deletions made by Barber-Greene Company to comply with current censorship."

...with Greenes

—a thousand major products—requiring almost every commodity used in our normal life—now required in a sudden rush of multiplied quantities. The ingenuity and unequalled efficiency of American products combined with the American spirit is responsible for the rapid progress of the defense program—a spirit that is showing the difference between being pushed together, and pulling together.

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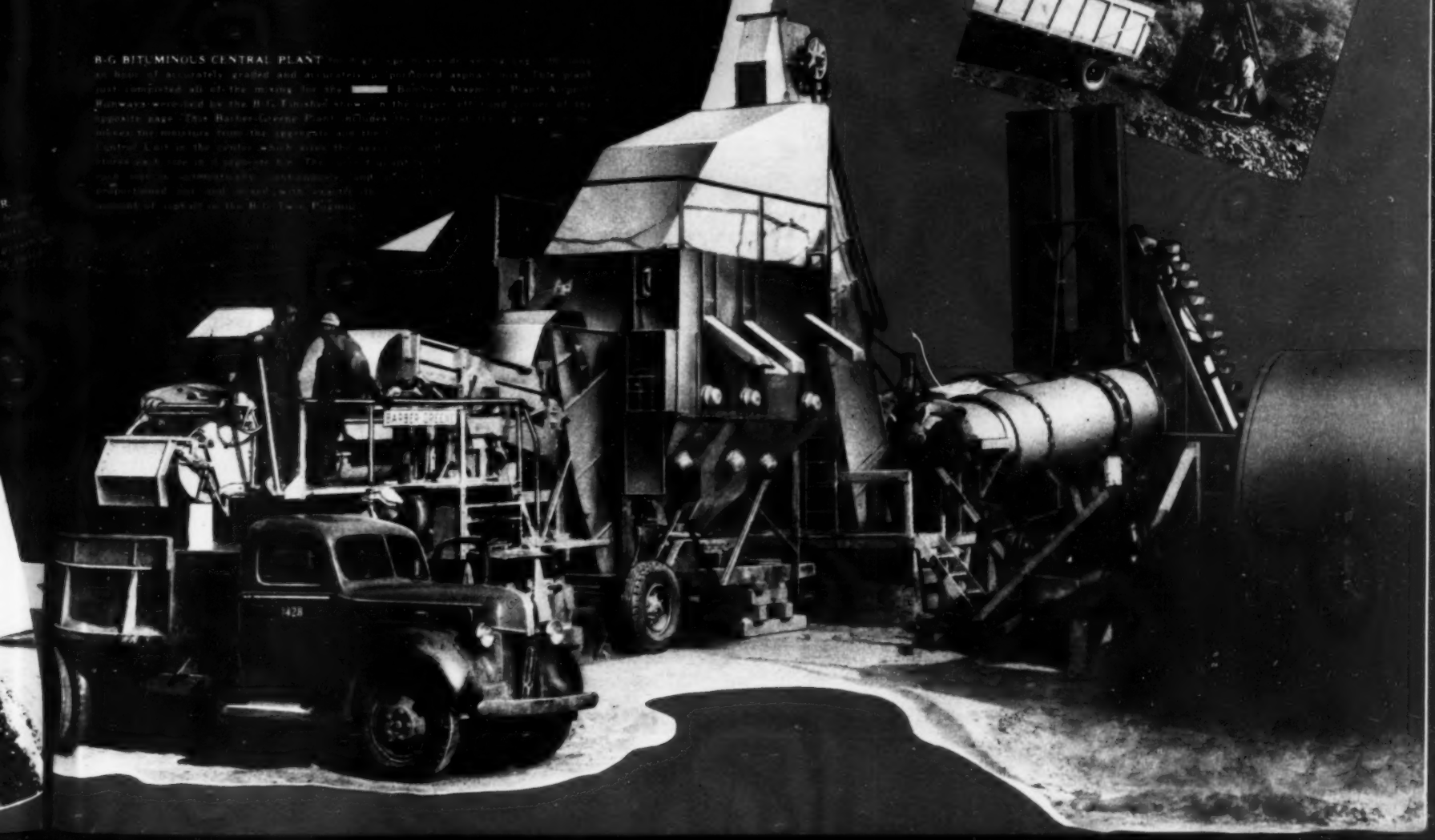
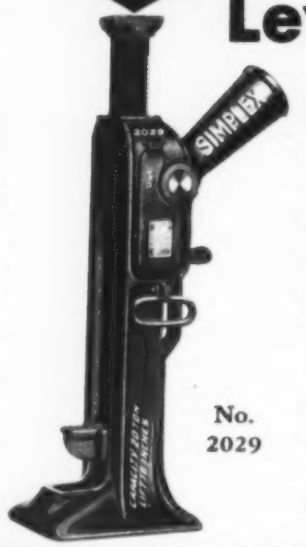
B-G BITUMINOUS CENTRAL PLANT



Do The Impossible in a Hurry! with

Simplex Lever Jacks

Inert 75-ton concrete block for supporting a forge hammer raised and moved to pit in a new plant by ten men with Simplex No. 2029 jacks. Barge sections jacked up by six 2029's—three on each side—so flat car can be run under. Staging eliminated by five 2029's supporting platform for pouring reinforced concrete sewage tank cover at army camp — these are typical stories filtering through to us of the time-saving, labor-saving jobs these and other Simplex Jacks are doing on war construction projects.



No. 2029

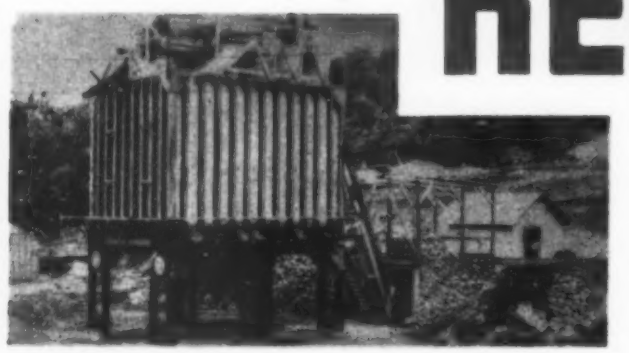
The 2029 lifts a full 20-tons 18" on cap or toe lift. Load can't drop. Lifting is on downward or effective stroke. Catalog 41 tells all about these and 5, 10 and 15-ton Simplex Lever Jacks.

TEMPLETON, KENLY & CO.
Chicago, Ill.

Better, Safer Construction Jacks Since 1899

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

Either way - make it a **Reliance**



CRUSHING PLANT

A complete unit—rapidly set up, inexpensive to operate, insuring large capacity, very little vibration. Crushing, elevating, washing, screening done on spot, materials stored in Reliance Steel or Wood Bins (completely fabricated, easy to erect). Experienced contractors put these Reliance Units together quick to meet any job capacity — at a profit. You, too, will do well to investigate.

PORTABLE *with* V-BELT DRIVE

Whether you use this Reliance Portable Crusher alone or in combination with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.

PRODUCTS:

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY COMPANY
KINGSTON, N. Y., U. S. A.

DISTRIBUTORS in ALL PRINCIPAL CITIES of U. S. A.

(Continued from page 117)

be noted that in such cases there will probably be no odor of gas even if the gas main is broken.

(3) Where there are trapped casualties in a building and there is reason to fear that gas service or supply pipes are broken, this should be reported for immediate attention, mention being made of the trapped casualties in the report to the Company.

(4) Where there is a large fire and the work of fire-fighting is impeded by escaping gas.

The following incidents should be reported for attention by the Gas Company as soon as parties are available from more urgent work:

(5) Where premises are damaged and there is a slight escape of gas, insufficient, however, to impede essential work.

(6) Where any high explosive bomb has fallen, even though there is no smell of gas or flooding. (Experience has shown that inspection is desirable as soon as practicable, since fractures to mains below the surface of the ground are possible).

(7) Where premises have been destroyed or seriously damaged by fire, but where the attention of the company's parties was not necessary at the time.

(8) Where delayed action or unexploded bombs are known to have fallen.

Measures Against Flooding

Section 2 of the foregoing instructions is most important. During the early days of blitzing, there was trouble with extensive flooding of the gas system at a time when the public wanted warm food, hot water and warmth in their homes. Since then the 3-in. diameter standpipes have been fitted at low points on all principal mains. At each divisional headquarters there is a water removal officer responsible for isolating the gas and water systems as quickly as possible. If water does enter the gas system it is pumped out almost as fast as it enters. There are a number of mobile gasoline-driven rotary and vertical-lift pumps, and, where necessary, the fire service can be called on for assistance, and for this reason standpipes have been designed to take the standard fire service suction pipe connection.

Upon receipt of a bomb report at the divisional gas control room, a report form is made out and the location plotted on a map. The operations officer decides what is to be done and issues instructions. From now on, a complete record of the job is entered on the bomb report form, which bears a serial num-

ber and is kept running until the main is finally repaired.

Immediate action during a raid is usually confined to a "first-aid" temporary repair. Most of the ideas developed before the war for stopping mains have proved of little value in actual practice. For instance, an asbestos suit is carried on every truck, but there has never yet been a single occasion when it has been either necessary or possible to use it.

Again, the cone stoppers (or plungers) for pushing into the ends of lighted gas mains have been used only on about 5 percent of the total number of incidents. This is because the ends of the main are so seldom accessible, being either cut back under the edges of the crater or covered by a mass of debris.

"Bagging-Off" Broken Mains

Immediate first-aid, therefore, consists of closing valves as far as they exist. If the broken main is being fed by other mains at several points, it may still continue to burn to a limited extent even after many valves have been shut. Generally speaking it is necessary to open down and "bag-off" the main, although small mains can sometimes be sealed with clay. Bagging-off consists of cutting a hole in the main and inserting a reinforced rubber bag which is then inflated. Having shut off the main the ends are secured for the time being with an expanding stopper or wooden plug and it is reported as "temporarily secured".

As soon as day breaks, every job is visited and an order of priority for permanent repairs decided upon. If the crater is small, the main is reconnected. If there is a large crater to be filled or a lot of debris to be cleared, the ends are capped up some yards back from each side of the incident until the final repair can be made. This may take some weeks if other services, such as sewers, have first to be repaired. Repeated watch must be kept by the outdoor staff and daily reports made so that the control staff is up-to-date with the progress of the work. There have been times when we have had as many as 500 mains jobs in hand on our division. It will thus be seen how important it is to keep an accurate record of each one until it is finally repaired.

The importance of educating air-raid wardens and getting their full coöperation cannot be exaggerated. On one night early in the blitz, of the total number of calls they made for assistance in our division, 42 percent proved to be genuine cases of mains on fire or other priority incidents calling for immediate attention, 11 percent were trivial incidents which could safely have been left until daylight next day, and 47 percent turned out not to concern the gas company at all. An organized system of training, undertaken by gas headquarters, has, however, improved vastly the accuracy of reporting damage.

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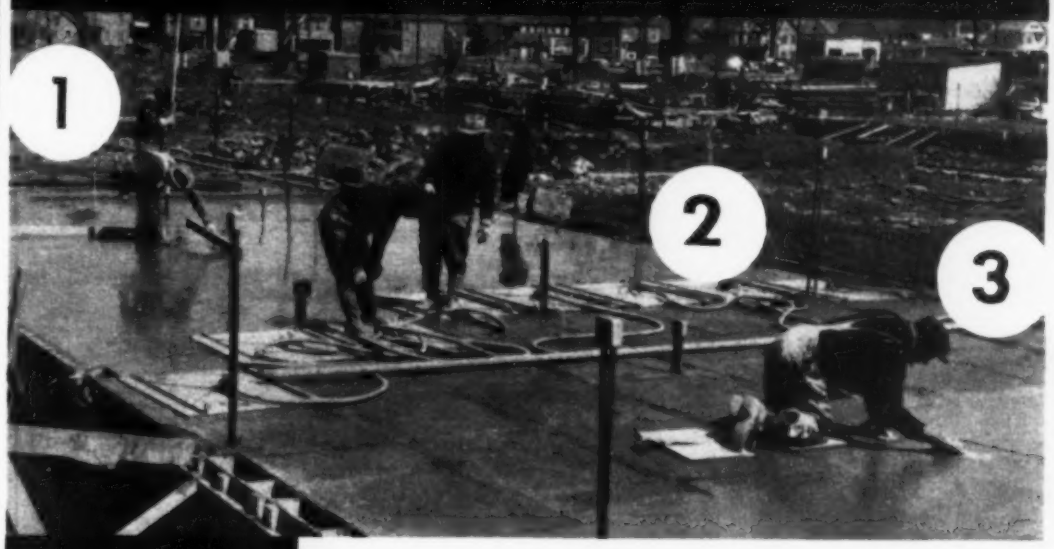
Mid Summer **SPEED ALL WINTER**

with **VACUUM CONCRETE**



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(2) Vacuum Suction mats remove excess water in 5 minutes.
(3) Finisher trowels VACUUM-hardened slab.

SPEED

Make larger daily "pours" — Concrete more days per month — with less overtime.

Re-use forms days earlier; slabs where excess mixing water has been VACUUM-removed are double-strong at three days.

ECONOMY

More economical mix.

Fewer forms needed with high-strength early stripping VACUUM CONCRETE.

Lower finishing costs — no "drier" dust-coat; no waiting time; trowel 30 minutes after placing.

No costly tents over slab; VACUUM-removal of excess water simplifies protection, shortens heating period.

SIMPLICITY

No changes — you concrete as always. Mats follow screeding down the pour (See photo above). Float and trowel back of mats — *hours earlier.*

We rent complete equipment with full time Supervisor to direct your men in operation of process. Nothing to buy, ship or store; no priorities, no expediting. We have ample equipment in stock and deliver to job when you want it.

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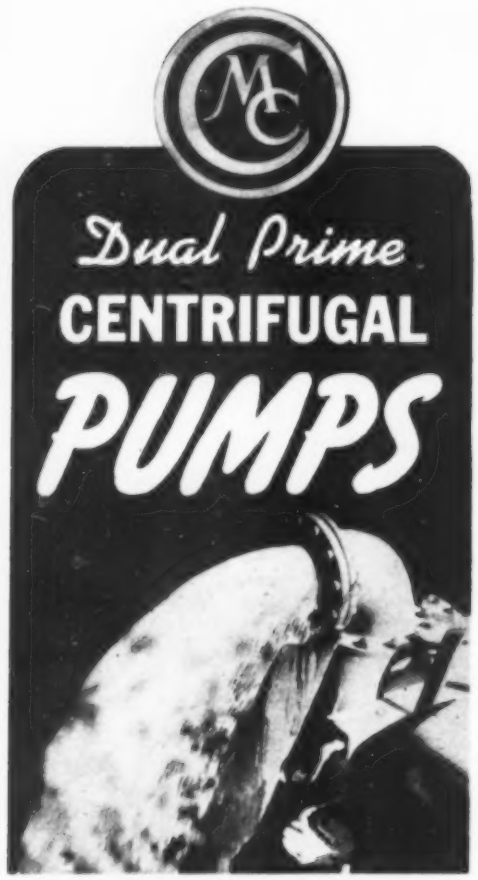

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Dual Sets of Mobile Forms Speed Construction of *Concrete Barrel Roofs*

(Continued from page 45)

and crushed rock of ¾-in. maximum size were used at different times as the coarse aggregate.

A roof unit required 380 cu.yd. of concrete, which was placed and finished as indicated by accompanying photographs. Two-wheel carts of 4-cu.ft. capacity distributed the concrete and dumped it into the forms. Wooden runways for the carts were supported by bents which rested on precast concrete blocks of a height equal to the depth of the concrete shell. Similar precast blocks of correct screed height were made up with shoulders to support reinforcing steel at the proper elevation above the form.

Placement of concrete in a roof unit started at the edge beams on the two sides of the building and progressed from the two edges to the center of the form. Concrete in a barrel shell was placed from the valley to the crown, first on one side and then on the other. Concrete was placed in the transverse stiffening beams ahead of the shell; only a small amount of concrete flowed through the opening at the bottom of the beam forms, where the shell connects with the stiffening members.

Roof concrete for some of the buildings was mixed and hoisted by a Koehring 1-yd. tower-paver unit with a 59-ft. tower. On the final storage warehouse, concrete for the roof was delivered by truck mixers, and a crane hoisted the concrete by bucket to a hopper on the roof runway. By this process a roof pour of 380 yd. could be completed in 5 or 6 hr. as compared with more than 8 hr. for the 1-yd. tower-paver outfit.

Construction Steps

All the storage buildings rest on foundations of Raymond step-tapered cast-in-place concrete piles driven to 30-ton bearing in hydraulic fill placed only a few years ago. The pile foundations were completed in advance of work on the superstructure. Each of the storage buildings includes two concrete-block firewalls which divide it into sections, and construction operations on the superstructure were carried forward more or less in accordance with these arbitrary divisions.

As soon as columns had been completed for the first section, roof forms were brought in to start the roof units. When the roof had progressed to the second section, carpenters began erecting forms in the first section for the concrete grade beams, which rise from pile caps to 5 ft. above floor level in the building. After the grade beams had been completed, bricklayers moved into the section to close the openings above the grade beams and between the columns with brick curtains.

Concrete roofs are covered with three-ply built-up roofing, and the buildings are lined on the inside with fiber insulating board 1-in. thick. The floors, laid on the ground, are 6-in. mesh-reinforced concrete topped by 1½-in. asphalt surface.

Roofs on all eight buildings are identical, but the structures vary in several other respects. Some buildings have floors at grade, while others, equipped with freight platforms along the sides, have their floors at platform level, 5 ft. above the ground. Two of the latter are of heavier construction to carry 10-ton bridge cranes in the five bays under the roof barrels; these buildings have intermediate columns between main-frame columns in the longitudinal direction to help support the craneways.

Clearance above the floor in the lighter buildings is 16 ft. to the bottom of the valleys and 22 ft. 9⅜ in. to the crown of the roof barrels. The two heavier buildings are some 9 ft. higher above the floor, but the clearance under the crane girders is just about 16 ft.

Quantities and Progress

Exclusive of piles, one of the light buildings with floor at grade required more than 6,100 cu.yd. of concrete and some 465 tons of reinforcing steel, plus nearly 175,000 brick and 5,800 sq. ft. of concrete-block firewalls. Quantities were larger for other types, particularly the two heavy craneway buildings, each of which took more than 9,000 yd. of concrete and 620 tons of reinforcing. The quantity of roof concrete, about 2,900 yd., was the same for all buildings. An average of 85 working days was sufficient to complete a building above the foundation piles, employing only an 8-hr. shift on most days, with additional shifts or overtime at intervals as needed.

Direction

Construction of the project is for, and under the direction of, the Bureau of Yards and Docks of the Navy Department. Rear Adm. Ben Moreell (CEC) U.S.N., is chief of the bureau. On the project itself, Comdr. A. D. Alexis (CEC) U.S.N., was officer in charge of construction until his recent transfer to another station. He has been succeeded by Lt. Comdr. E. A. Verpillot (CEC) U.S.N.R., formerly executive officer.

G. W. Bailey is project manager for the contractors, the Wigton-Abbott Corp., and the Mahony-Troast Construction Co.

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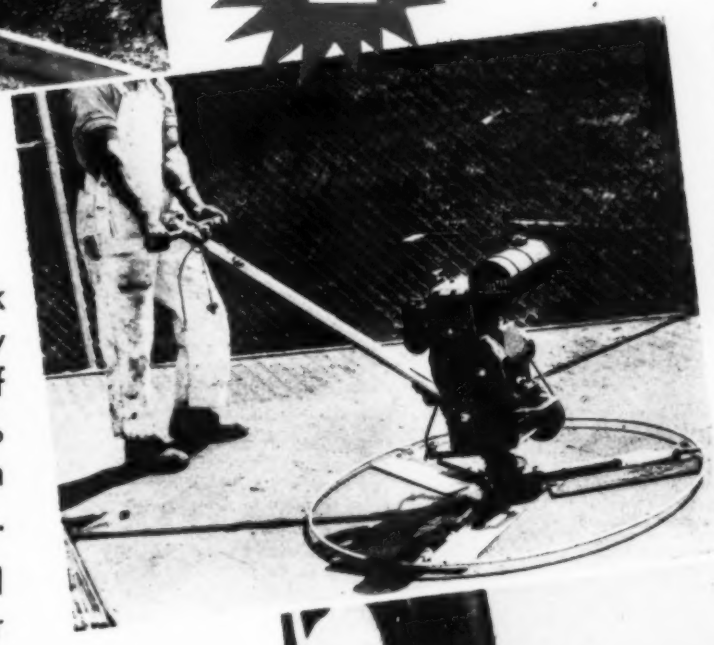
SCREEDING — The **WHITEMAN** Rodding Machine has power operated screeds making 5-in. transverse strokes on the header boards. **ONE** operator, with a steady forward pull, advances the machine which levels and compacts the mix as it progresses. Low slump mix is no problem — this machine handles 4 yd. of 1-in. slump in 5 minutes.

2

FLOATING — **ONE WHITEMAN** dual-purpose machine both floats and finishes your concrete. Simply attach the "Heavi-Duti" 12 gage steel trowels to your **WHITEMAN** Finishing Machine when ready to float the slab. **ONE** man can cover 1,000 sq. ft. in 15 minutes . . . the concrete being leveled and compacted with the moisture brought to the surface.



FINISHING — Using the same **WHITEMAN** dual-purpose Finishing Machine after attaching the 17 gage steel "Finish" trowels, **ONE** operator guides the rotating, controllable-pitch trowels over the slab. 1,000 sq. ft. can be covered in 15 minutes giving, without any handwork, a smooth level surface.

3

WHITEMAN Machines work equally as well indoors or out. They will increase the labor capacity of your present finishing crews by 40% and produce better concrete even under adverse weather conditions.

On large or small areas, WHITEMAN Machines permit the use of a drier mix, will spread and finish it in less time with fewer men, and still deliver denser, stronger, level concrete at lower cost.

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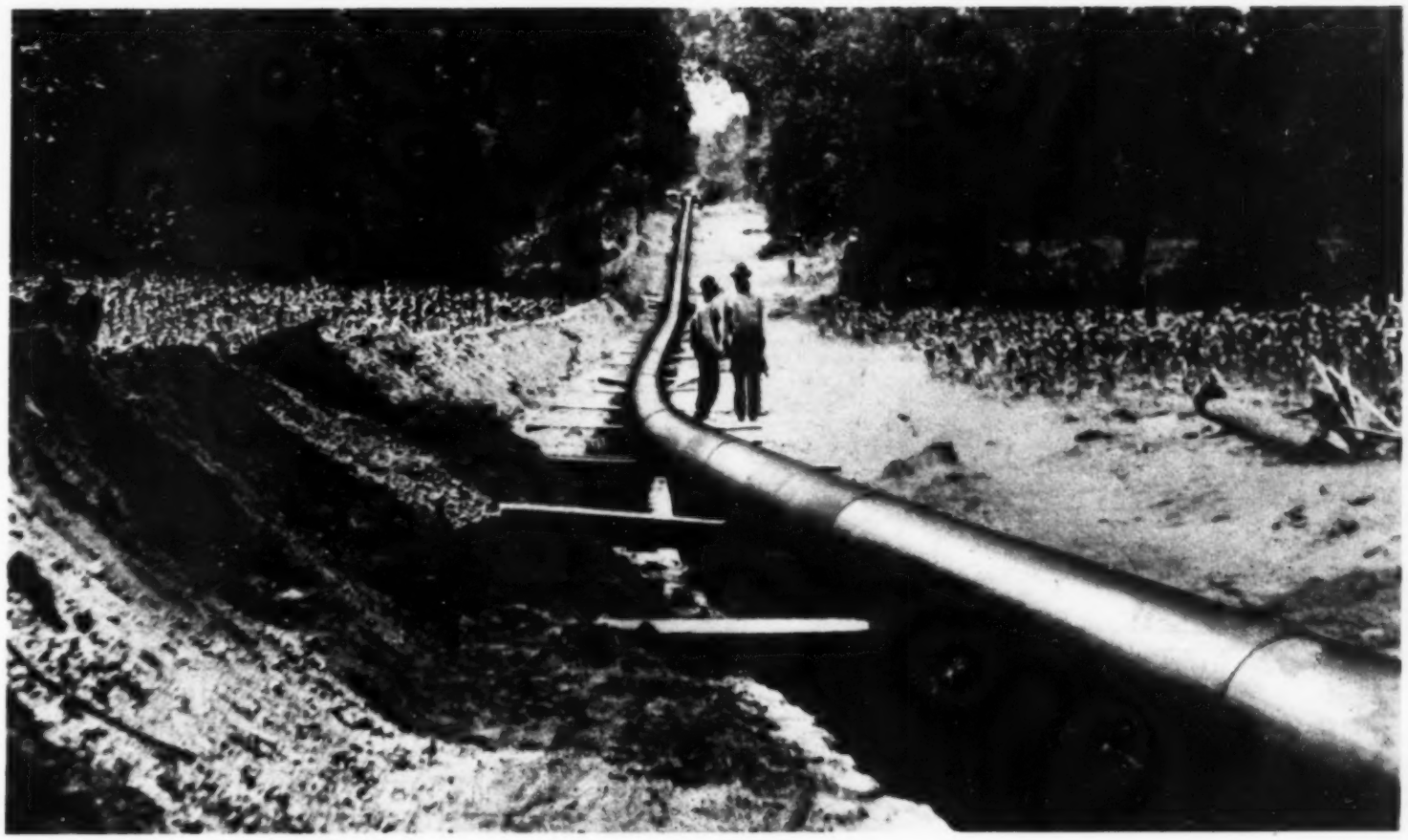

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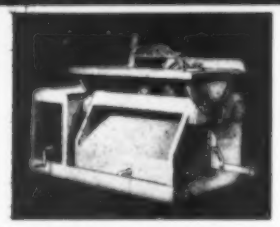

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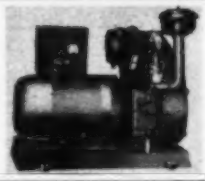

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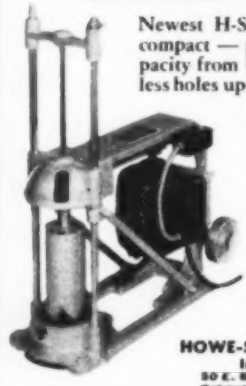

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This WHERE TO BUY *Section*
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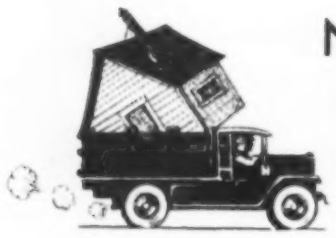

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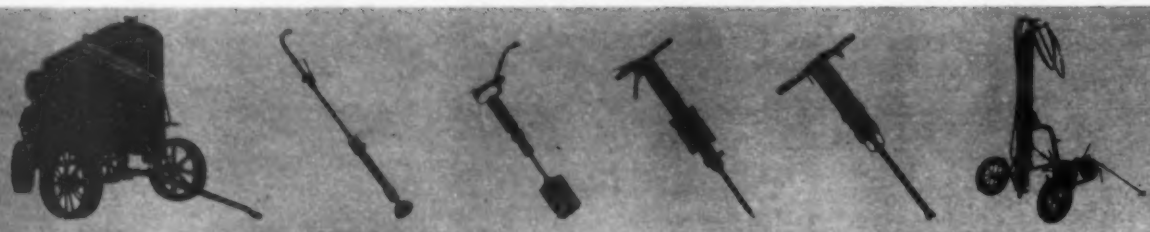

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